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*—From one of 168 reports sent in by typical Iron Age subscribers.



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United Business
Publishers, Inc.

THE IRON AGE

PRODUCTION ■ MANAGEMENT ■ PROCESSES ■ NEWS

METAL EXPOSITION NUMBER

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THE IRON AGE PUBLISHING COMPANY, 239 WEST 39th ST., NEW YORK

Division of United Business Publishers, Inc.

SEVENTY-EIGHTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY

THE IRON AGE

NEW YORK, SEPTEMBER 22, 1932

Vol. 130, No. 12

ESTABLISHED 1855

A Modern Phoenix Will Rise from Its Ashes

PHOENIX, fabled bird of antiquity, was consumed in fire by its own act and rose with renewed youth from its ashes. The power of fire to purge and refine has been known for centuries. Man early learned to use fire to purify and temper metals. His accumulated experience through many generations developed an art that produced the famed Damascus steel. But that art was shrouded in mystery; its intricacies were jealously guarded and handed down under oath of secrecy from master to apprentice.

It was only with the coming of the modern age that the hoary and mystic craft of steel treating was transformed into a science. It was only when research and engineering replaced secrecy and handicraft that the traditional and the empirical gave way to the precise, the technical. Under the penetrating light of the scientific method that great boon, fire, was restudied and reharnessed for the service of man. What had been left to skill, to experience, to guess, was displaced by an ever-improving technique that left less and less to chance and made present-day production possible.

The fire and heat that transform the physical properties of metals have their metaphoric counterpart in the fire of depression which has just swept through the economic world. Much has been destroyed; yet what remains has been purified, refined, tempered, hardened and toughened so that it will better perform the work that lies ahead. Much of the research and experimentation which has been carried on in the face of adversity will now bear fruit. Much of the enterprise and initiative that has been restrained by untoward conditions will now be released for constructive purposes. A better and stronger economy, vitalized by renewed hope and energy and improved methods and technique, will come into being. A modern Phoenix will rise from its own ashes.





A New Field for Nitralloy

IN the year 1920, Dr. A. Fry, Essen, Germany, discovered the method of case-hardening steel with nitrogen. However, its real commercial value was not appreciated until 1927. From that time on its progress has been rapid, and it is now recognized as an outstanding metallurgical discovery.

Its application to gears, valves, airplane and automobile crankshafts, piston rods, pins, bushings and locomotive reciprocating parts has proved notably successful.

Recent experiments have also been successful in adding aluminum to cast iron and cast steel. Centrifugal cast sleeves and liners of almost any diameter and length are now practical. Such parts when nitrided will have a case hardness (Vickers Brinell) on iron of 750 to 825 and on steel 900 to 950.

This discovery will open up an entirely new field for nitralloy, as the value of such hardened parts in Diesel engines, pumps and other applications cannot be estimated.

—Camden Forge Co.
Camden, N. J.

Present Steels Expand Service Applications

IN forecasting technical development of alloy steels, the metallurgical department of the Timken Steel Tube Co. anticipates the willingness on the part of steel users to employ better materials whenever design or performance can be improved. Economy will be sought less often in raw materials than in processes of fabrication or endurance of finished articles.

The recognition of this attitude has permitted an extension of present steels to new fields of service. Fine-grained alloy carburizing steels are in greater demand because simple direct-quenching treatments have been developed. A new method of heat treating forgings has also increased the machinability of these steels. Likewise, the machinability and durability of coarse-grained oil-hardening gears have benefited from researches on the character of the forging steels.

Following the same principle, the Timken mill has perfected the hot rolling of "Akuroid" bars, which are so uniform in size as to be suitable for automatic machines. In

From Test Tubes

Salient Points of Progress in Metallurgy, Heat Treating and Mechanisms

addition, this product exhibits a texture of finish and homogeneity not expected in "as-rolled" steel.

In the case of high temperature and corrosion resisting steels, new compositions are being evolved and familiar analyses applied to new uses. These materials will be available in tubing form, rolled shapes and forging steels, for oil refineries, chemical plants, and in the manufacture of articles subject to natural corrosion or specific types of chemical attack. Much experimental work has already been accomplished in the selection of steels having high creep strength, stability under corrosion-fatigue, and resistance to corrosion by petroleum products.

—Timken Roller Bearing Co.
Canton, Ohio

Mechanical Handling in Steel Plants

NEW uses are being found continually for the application of conveying equipment in steel plants; not the conventional applications, but numerous unique arrangements which tend to effect savings in the production costs of the finished product. In spite of this, however, steel plant operators are not fully aware of the possibilities of reducing production costs through the use of conveying equipment.

In a new continuous sheet mill installation incorporating the most up-to-date equipment at the finishing mill it is found that 90 per cent of the equipment installed, besides the necessary furnace, consists of conveyers. For example, conveyers handle the sheets from the roughing mill back to the loading end of the furnace, and a power driven runout table at the discharge end of the furnace feeds the feeder and catcher tables; sheets travel from there on conveyers to roller levellers, and from there to a point adjacent to shears.

The application of conveyers in this particular industry is making headway, the more progressive operators are taking note of these various installations and in some cases endeavoring to fit conveyers into their own plants. But there is much to be done along this line both by the conveyer manufacturer and by the steel plant executive.

Mathews Conveyor Co.
Ellwood City, Pa.

Adds Flexibility in Heat-Treating Equipment

WE will exhibit this year, at the National Metal Congress, for the first time, our new Bell type retort furnace.

This furnace, we believe, more nearly approaches a universal heat-treating tool than any equipment which has thus far been brought out. It can be employed for

Board T-Squares

gas carburizing, nitriding, bright annealing, using hydrogen or inert gases; it can also be employed for applying our new Machlet Ni-Carb case. These various treatments can be given in addition to the usual hardening, tempering and annealing operations, the hardening to be done in a manufactured or natural gas or an inert gas atmosphere if desired.

The new Ni-Carb-case treatment mentioned is especially interesting as it provides a thin, very hard case which is quickly and easily applied. It was developed primarily to take the place of cyaniding; however, no cyanide is used; it is a gas process. It can be varied as to the depth to meet different requirements. It is remarkably resistant to rusting. Thin cases combine a satisfactory degree of hardness and toughness which permit bending and peening the treated parts without spalling of the case. In this treatment quenching may be employed or omitted to suit the requirements.

Our new Bell type furnace not only has an extremely wide range of flexibility so far as treatments are concerned, but also in the treatments subsequent to quenching. With this is combined exceptional uniformity of temperature, low fuel consumption because the retort is entirely enclosed in the furnace and because the spent carburizing gas is combusted in the furnace to reduce the fuel gas consumption.

—American Gas Furnace Co.
Elizabeth, N. J.

Keen Competition Spurs Drop Forging Practice

THE drop forging industry, operating during the past year at the lowest rate in its history, has been able to retrench to meet conditions and has come through with very few fatalities to this point, where a better tone prevails and the general sentiment is that the corner has been turned. In dull times, with only a few hammers operating, the general practice is not to keep up hammer repairs. When the upturn comes, parts are ordered to put the hammers into serviceable condition, and judging by this barometer most shops are looking for higher production next year.

As is to be expected, the possibility of increased economy of operation has had major attention in the period just past, and the forge shop equipment manufacturer has been kept busy furnishing advice on such matters. In the steam drop hammer field, the savings due to the use of a ring type motion valve have been demonstrated by careful tests in a number of plants, and many shops have equipped their hammers so that they will operate with a decidedly lower steam consumption in the future.

Board drop hammer shops have always claimed more economical operation than steam drop hammers, but they have been handicapped by the greater flexibility of the steam drop hammer, which makes it more desirable for many classes of work. The handicap of the board drop hammer in this respect has been overcome with the recent development of a new type of control for board drop hammers, which makes it possible for them to strike a light or a heavy blow at the will of the operator, changing instantly from one to the other.

Forced by keen competition and the constant pressure for lower prices, the industry has been looking for a new method of making forgings. Heavy presses instead of hammers seem to be the most logical development, and such machines, equipped with automatic feeding mechanism, are now being built and installed. The possibilities of such machines, one of which will produce as many forgings as a number of hammers, are tremendous, and the effects of developments now taking place may be far-reaching. At present, only long run jobs and certain types of forgings are being considered, and if hammers are displaced, the process will be a gradual one, as the new tool reaches out to take in wider fields of application. The investment required in presses, feeding mechanism and furnaces will be very heavy, but, on the other hand, the industry will benefit from the increased volume that will accrue, as castings and stampings will be replaced by drop forgings when the superior qualities of the latter are available at lower price levels.

—Erie Foundry Co.
Erie, Pa.

Development Trends in Arc Welding

THE past year has brought to us a more advanced electrode. We have developed a heavy flux coated electrode which will give high tensile strength and high ductility in the finished weld. This is accomplished by the use of a special coating which protects the metal as it passes through the arc, by surrounding the arc with a gaseous vapor, thereby protecting the metal during transfer and the molten pool under the electrode from the action of the atmosphere.

These electrodes operate at voltages of approximately 35 volts instead of 18 to 20 volts normally used with bare electrodes. A complete line of welding motor generators to take care of the higher ratings required in the use of these new electrodes has also been developed.

One of our most recent developments is the Westinghouse Flex-Arc A.C. Welder, 100 ampere rating, with short wave arc control. This unique welder meets the demand for the economical arc welding of thin-gage material such as that encountered in the manufacture of metal furniture, sheet steel cabinets, steel frame houses, and air craft fabrication work. It has been found to be excellent in the welding of aluminum and it has made possible the electric arc welding of alloys which heretofore could not be welded successfully.

—Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

Heat and Corrosion Resisting Alloys

THE users and prospective users of rolled alloys must of necessity have a keen interest in castings of complementary analyses. The consideration of castings is vital to intelligent employment of wrought alloys and in the erection of structures or mechanisms in which these alloys are employed.

We, as manufacturers of heat, corrosion and abrasion resisting alloys exclusively, and with an experience of 13 years in the production of high grade castings from

Salient Points of Progress in

these alloys, which are handled with extreme difficulty, believe that it is important to emphasize the availability of sound castings of any of the commonly employed analyses, suitable for use with and in conjunction with tubing, wrought products, etc., produced by the rolling mills.

—General Alloys Co.
Boston

Recent Developments in Oxy-Acetylene Welding and Cutting

THE deseaming blowpipe has been applied increasingly during the last year for the reconditioning of semi-finished steel in steel plants and for surface removing operations in steel foundries, forge shops and other steel working plants. By means of a low velocity jet of oxygen issuing from a comparatively large nozzle, grooves up to 2 in. in width and $\frac{3}{8}$ in. or more in depth can be cut at linear speeds of from 15 ft. to 30 ft. per min. by the average operator. Under certain circumstances, much higher speeds are possible. It is expected that this blowpipe will revolutionize practices in the removal of metal in steel forming as well as in the removal of excess metal, cracks, checks and other defects from steel castings and forgings, and in the preparation of vees for butt type welds in thick plates.

The Lindeweld process of oxy-acetylene welding, which has revolutionized pipe line welding practices since its introduction two years ago, has been successfully applied to the welding of tubular joints in aircraft. Joints in unusually thin tubing, which previously had not been satisfactorily welded by any other means, have been successfully made by the new welding method.

The field for bronze welding has been greatly increased in scope by the recent introduction of Oxweld No. 25 M. bronze patented welding rod. With this new rod, bronze welds joining steel can be readily made with strengths between 56,000 and 60,000 lb. per sq. in., and with ductility in excess of 30 per cent. Density, hardness and strength in shear are also greater than with bronze rods previously available. Because of its desirable properties, this rod is finding many new applications in the building up of wearing surfaces on steel, cast iron and bronze, and in the fusion welding of brasses and bronzes, as well as in the joining of steel and cast iron parts at temperatures much below their melting point.

—Linde Air Products Co.
205 E. 42nd St., New York

Rubber Lining for Steel Pickling Tanks

THROUGH cooperation between engineers of the steel industry and engineers of the rubber industry a definite improvement has been made in the design of tanks for steel pickling. Welded steel tanks lined with "Triflex" rubber are proving highly satisfactory in pickling operations, as well as for many other industrial processes where corrosion and rough usage are encountered.

Triflex is a new form of rubber lining, comprising a layer of hard rubber cushioned between two plies of resilient soft rubber. The three plies are vulcanized together to form an integral lining structure which has proved remarkably immune to physical damage by shock,

impact or gouging. In addition, this three-ply construction combines the resistance of true hard rubber to chemical and solvent action, diffusion and absorption, with the resilience and wear-resisting qualities of the soft rubber face layer. The relative thickness of the three plies may be varied within rather wide limits to obtain the desired properties for each type of service. Sudden variations in temperature, which are often hazardous to hard rubber linings, have no adverse effect.

Triflex is bonded to steel by the Vulcalock process of the Goodrich company, which insures a minimum adhesion of 500 lb. per sq. in. between lining and tank. Overlapping expansion joints are provided at suitable intervals, serving effectively to prevent cracking or buckling of the hard rubber layer under expansion and contraction with extreme changes in temperature. Where service conditions are exceptionally severe, as in many steel pickling operations, sheathings of timber, acid brick or vitrified paving brick are installed.

The urgent need for improvement in pickling tank construction has long been recognized. With the continued success of Triflex lined installations, it is justifiable to state that a fundamental advance has been made. The success of this development has in large measure been due to the efforts of progressive engineers and executives in the steel industry who are continually striving for reduction of maintenance costs and improvement of working conditions.

—B. F. Goodrich Rubber Co.
Akron, Ohio

Increases Wear Resistance of Medium Carbon Steels

A PARTICULARLY significant development in the increasing use of the Aerocase process in heat-treating shops throughout the country is the result experienced in recent production work on the heat treatment of medium carbon alloy steels. Rigidly controlled dynamometer tests on transmissions treated in Aerocase on a production basis show that these gears are vastly superior in wear-resistance to gears which have heretofore been treated largely in other salt baths. In some cases the dynamometer life of the gears has been increased as much as 400 per cent. The Aerocase treatment also results in considerably higher impact values.

The increased wear-resistance of gears treated in Aerocase is attributed to the higher percentage of carbon in the carbon-nitrogen ratio than is found in a case produced in other salt baths. It is believed that, in a case with a higher nitrogen ratio, brittleness produced by the presence of iron nitride lends to earlier pitting of the gears.

Such results as these indicate the possibility of the use of steels with lower carbon content with attendant savings in processing costs.

—American Cyanamid & Chemical Corpn.
535 Fifth Avenue, New York

Air Conditioning Will Stimulate Metal Market

WE note a greatly increased interest in air conditioning equipment of all kinds. Being one of the oldest manufacturers of this, we have naturally been

Metallurgy and Mechanisms

active in the design of equipment of higher efficiencies; in many cases, lower first costs, and in all cases, lower operating costs. In our opinion, the greatly stimulated activity in the production of air conditioning equipment is going to mean a larger metal market when business improves to an extent where home building will be resumed.

—**Buffalo Forge Co.**
Buffalo

Trend Toward Special Alloy Castings

WE have noted a steadily growing interest in the use of stainless steels in cast form, particularly of the 18 per cent chrome, 8 per cent nickel variety with carbon analysis 0.12 per cent maximum, indicating that this type steel apparently has distinct advantages over steels of similar analyses with higher carbons. There is also considerable interest being shown in this same type steel with free-machining and non-seizing qualities.

Another interesting development is the widespread interest indicated in the oil industry in a steel having an approximate analysis of 5 per cent chromium, 0.50 per cent molybdenum, this steel developing high yield values, small creep, coupled with fair corrosion resistance. As a matter of fact, the general trend in a great many industries is toward the use of special alloy steels in cast form for specific purposes where normal carbon steels or other metals had previously been used.

—**Lebanon Steel Foundry**
Lebanon, Pa.

A Saw with Tungsten-Carbide Teeth

OUR most recent development of importance is the introduction of the tungsten-carbide tipped circular saw, described in *THE IRON AGE*, July 21. It is designed to cut all types of asbestos compositions, ebony and other hard woods, insulating materials, hard rubber, plastics, linoleum and other fibres that contain glues or gritty substances.

The saw is made with several different styles of teeth, adapted to specific materials. It takes a feed of 50 ft. per min. and operates at speeds ranging from 5400 to 10,000 ft. per min., depending on the material and the machine. Long operating life of the saw between refittings has been our experience.

—**E. C. Atkins & Co.**
Indianapolis, Ind.

Develops Heavy Duty Chilled Cast Iron Roll

A NEW heavy duty chilled cast iron roll, recently developed and patented by the Krupp Works, is now being supplied by Thomas Prosser & Son. This roll, known as "Gwk 100," is a product of the electric furnace and has a special alloy content, with a hardness of 90 to 95 Shore.

The close grained and compact structure closely resembles that of a steel roll and the surface can easily and economically be polished to a high finish which will produce the highest grade of finished surface of the most varied metals. It is used principally for cold finishing sheets, both of iron and steel, as well as automobile body

sheets. The roll is indifferent against fluctuations of temperature up to about 100 deg. C., and is not subject to cracks and scales usually encountered on the middle roll of three-high mills; in fact as center roll it is superior to hardened chrome steel rolls.

The penetration of the chill in the roll is not limited to the tempering zone, but reaches nearly to the core of the roll with only slight reduction in hardness. The "Gwk 100" roll overcomes the disadvantages of reduced tensile strength with increasing hardness and thereby greatly reduces the possibilities of breakage.

The Krupp Works have already supplied a great many of these rolls throughout Europe and in all cases they have proved satisfactory in service.

—**Thomas Prosser & Son**
15 Gold St., New York
(American Representatives of Krupp Steel Works)

Furnace Refractories Improved

WE have recently introduced a new type of refractory for use in electric furnaces. The material is called "Tercod," using the same name as the Tercod crucibles, which in the last ten years have attained such wide use in non-ferrous foundries.

A unique characteristic of Tercod material is its exceptionally low coefficient of thermal expansion—.0000027, which is just about half of the expansion found in other high-temperature refractories. As a result of this exceptionally low figure, the resistance to spalling makes Tercod ideal for electric furnace roof and door locations, such as door brick, door jambs, lintels, and sill blocks.

Our corporation has included in its Kellogg line of silicon-carbide refractories, thin-walled muffles, tile and hearths for heat-treating and annealing furnaces, providing a high-conductivity material with greater mechanical strength than previously produced. This great strength permits greater freedom of design of combustion chambers, where maximum heat and minimum combustion space is desirable.

—**Electro Refractories & Alloys Corp.**
66 Andrews Building, Buffalo

Chrome-Tungsten Steel Developed for High Temperatures

"SUPERTEMP" is a commercially priced chrome-tungsten steel developed by Bethlehem Steel Co. for use in parts that must retain their strength and have a minimum of creep at high temperatures. This steel is finding extensive application for bolts and studs used in oil refinery apparatus and other places where high temperatures are encountered.

There has been an increasing demand in recent years for a steel with high physical properties at elevated temperatures due to the new processes which have been developed, such as oil cracking stills which operate at temperatures of around 900 deg. F., also for boiler work which operates at higher and higher temperatures and increasing pressures, and other power plant applications.

Heat-treated "Supertemp" steel shows at room tem-

Salient Points of Progress in

perature 132,000 lb. per sq. in. tensile strength, 120,000 lb. per sq. in. elastic limit, and 21 per cent elongation in 2 in. and 61 per cent reduction of area. A short time test at 1000 deg. F. shows 100,000 lb. per sq. in. tensile strength, 80,000 lb. elastic limit. Its creep test value at 1000 deg. F. is 11,500 lb., which is considerably higher than any competing commercial steels used for like purposes.

—**Bethlehem Steel Co.**
Bethlehem, Pa.



Dissociated Ammonia in Furnace Atmospheres

DURING the past few years the metal industry has seen new advancements made in the application of electric heat in various processes. The use of controlled furnace atmospheres has probably received the greater measure of general interest. Due to its cleanliness and lack of combustion products, electrically heated equipment is especially amenable to the introduction of an artificial atmosphere.

Various means have been used for producing an inert or reducing atmosphere within the furnace, and in most cases a gas containing an appreciable percentage of hydrogen has been found to be most satisfactory. A number of methods for producing a hydrogen-bearing gas have been used, and of these the dissociation of anhydrous ammonia is of especial interest. By means of a comparatively simple and inexpensive electrically heated "cracker," the ammonia is decomposed into its elements, namely, hydrogen and nitrogen. Since the raw material—anhydrous ammonia—is not only dry, but free of all impurities, the cracked gas also contains no deleterious products such as sulphur, hydrocarbons, oil or oxygen.

In addition to its use for artificial furnace atmospheres, cracked ammonia is being used for the reduction of metallic oxides such as molybdenum and tungsten, for atomic hydrogen welding, aluminum welding, etc. With few exceptions, hydrogen used in industrial operations may be replaced by cracked ammonia.

—**Ajax Electric Co., Inc.**
Philadelphia



Chrome and Nickel Alloys Improve Wire Cloth

THE study of the properties of various alloys of chrome and nickel with iron has led to an interesting list of new products in the wire industry. Now screen cloth can be made that is practically corrosion proof under the most severe conditions. Metallic cloth is available for industries which considered it hitherto impracticable and conveyor belts may be furnished for heat treating and for chemical manufacture in ranges hitherto impossible.

The Wickwire Spencer Steel Co. has pioneered in these developments and now offers a complete engineering service which will afford the user a detailed study of his conditions, and which will recommend the proper type of installation for any continuous process of heat treating, annealing, filtering or drying. Special features of design of edges, carrying surfaces and elevators have been developed so that practically any combinations of tempera-

tures up to 2000 deg. F., weight carrying capacity, and type of material treated may be successfully furnished.

Both spiral woven and flat plate type belts have been developed and many installations prove the success of the designs.

All types and meshes of square mesh woven wire cloth using wire from coarse sizes to as fine as 0.003 in. may be furnished, and their stability under trying conditions has been proved.

—**Wickwire Spencer Steel Co.**
41 E. 42nd St., New York



High Strength Gray Iron Demands Proper Specifications

TO secure the advantages of high test cast iron, specifications should be written with the definite requirements for such irons in mind. The use of ordinary specifications indicating somewhat advanced strengths with the hope that the proper foundry may supply the material is inadequate. Plain definite statements as to strength and character of section required should be made. Alternate methods of manufacture may be stated and reasonable limitations as to analysis based on statements made by manufacturers should be included.

Such specifications can be written to insure adequate physical characteristics and allow cast iron to take its rightful place in the design field to which its very valuable attributes entitle it. Such specifications seem to be almost non-existent in purchasing department inquiries.

Perhaps the greatest drawback to the use of cast iron in the past has been its rather low tensile strength and the fact that reliance could not be placed on securing in castings the values for physical characteristics indicated by test bars. Added section often resulted in less reliability.

Definite advances have been made in the physical characteristics of some cast irons available today. The physical characteristics as indicated by test bars may be definitely depended upon to be present in castings made of these irons. This places cast iron among the materials which may be used in design with a certainty that adequately designed sections will carry the loads assigned to them without failure.

Iron should be purchased to as definite physical characteristics as steel.

—**Michigan Valve & Foundry Co.**
Detroit



Gray Iron From Electric Furnaces

ASTONISHING results have been obtained in various types of gray iron through three years of study and development work devoted by the Detroit Electric Furnace Co. to the improvement of cast iron.

Irons showing 55,000 to 60,000 lb. tensile strength, with excellent machining qualities, are readily and economically produced from melting charges of scrap and borings, or of all borings. Charges of pig iron and scrap and borings may be melted and castings showing any desired physical characteristics may be produced. Unusually high grade castings are produced from charges

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consisting of steel scrap, recarburization being accomplished by adding the required amount of petroleum coke to bring the carbon content to any predetermined analysis.

Irons produced in this furnace using no alloys, but with simple subsequent heat treatment, show 90,000 to 110,000 lb. per sq. in. tensile strength with 2 to 4 per cent elongation, and possess excellent machinability. The rocking action of the furnace makes it an ideal medium for the introduction of alloys into the molten iron in those cases where the advantages peculiar to certain alloy irons are desired. Absolute uniformity and homogeneity are definitely assured.

It is our conviction that this facility for the economical production of iron castings of such characteristics, permitting the utilization of thinner sections of lighter weight and greater strength must necessarily act as a stimulus to the cast iron industry in the immediate future.

—*Detroit Electric Furnace Co.*
Detroit

Stainless Steel More Than Holds Its Own

THE outstanding feature of the stainless steel business during the past year, and one which is worthy of comment, is the remarkable way the tonnage has held up in comparison with the tonnage of ordinary steel.

The total Bessemer and open-hearth production for the first seven months of this year is only 48 per cent of the tonnage produced during the first seven months of 1931. We find, however, in going over our records that the tonnage of genuine stainless steel produced under our patents and reported to us by our licensees for the first seven months of this year is 67 per cent of the tonnage reported for the first seven months of 1931.

The explanation of this better showing of stainless steel as compared with ordinary steel I think is found in the awakening of industry in general to its advantages and the application of the material to new uses. This broadening of its field has naturally offset much of the decline in the tonnage which was going into the more limited range of products for which it was used last year.

We are, of course, encouraged by this showing and believe that with the return of normal industrial conditions the tonnage of stainless steel will far surpass even the record production of 1929.

—*American Stainless Steel Co.*
Pittsburgh

Furnace Engineering Achieves Economies

THERE has been considerable development in our furnace engineering division during the past year, particularly in connection with water seals and syphon vents for industrial furnaces. These devices prevent infiltration of air, provide maintenance of proper furnace atmosphere and prevent injurious scaling of stock.

The water seal has added materially to the operation of rotary forging furnaces and led to the development of a new progressive hearth forging furnace, particularly adapted to heating billets.

A walking beam furnace of new design for various uses is now available, built along novel lines not heretofore used, and which has been well received by the trade.

Further development in automatic forging furnaces for high-speed press operation reduces the number of furnace operators to one man and furnishes a uniform heated stock free of injurious scale, which is necessary for high-speed press operation.

—*Gas Machinery Co.*
Cleveland

Chromium Plating Supplied for Plant Use

WHILE many metal-working plants have proved the feasibility and economy of chromium plating to multiply the wear-life of new tools and parts, to readily salvage worn tools, and to reduce breakdowns with their consequent tool-settings, a large part of the metal-working industry has not employed this important means of reducing costs. The problem of obtaining a properly designed and balanced plating outfit has deterred many plants, since it involved the purchasing of a dozen or more parts, and then putting the job of correct assembly and installation up to inexperienced plant men.

However, such difficulties need no longer stand in the way of plants desiring the advantages of chromium plating. United Chromium engineers have designed a compact plating unit expressly to meet the needs and operating conditions of machine shops. It is designed so that it may be installed right in the tool room, and is so simple that it can be successfully operated by a workman in the shop. This equipment greatly simplifies the chromium plating of tools and parts in the regular routine of a plant. It comes as a unit, ready for connection to steam, water, waste outlets and power line.

Plants using the equipment, under the United Chromium licensing plan, have the benefit of a complete engineering and advisory service.

—*United Chromium, Inc.*
51 E. 42nd St., New York

Heat-Treated Light-Weight Bus Seats

GROUND transport industries, including the motor bus, the street car and the railroad, are realizing the advantages and economies to be gained by the elimination of useless weight in their vehicles. They turn, naturally, to the aircraft industry for materials, methods and engineering practice. A recent development in this field is the production of light-weight seats for transport vehicles by Metallurgical Laboratories, Inc., of Philadelphia, better known as "Metlab," specialists in the fabrication and heat treatment of aircraft metal parts.

The frames of these seats are constructed of aircraft chrome-molybdenum steel tubing and are designed to insure the utmost strength and durability under the severe service encountered on the road. They will withstand 1000 lb. static load. Fully upholstered, they weigh only about half as much as the present types of seats. The tubular members are formed and fabricated in the annealed state, assembled by acetylene welding, and the completed seat frame is then heat treated as a single piece, in the Metlab aircraft vertical electric furnaces, to a strength of 160,000 lb. per sq. in., or more. The material and construction provide exceptionally high resistance to failure by fatigue or accidental overload, and

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the tubular frame itself has resilient, shock absorbing qualities.

Vehicle manufacturers and users are showing great interest in these heat-treated seats and are also taking advantage of the use of high strength aircraft steel in bumpers, hand rails, stanchions and other interior and exterior fittings. The general tendency toward economy will probably result in a widespread elimination of excess weight by the increased use of heat-treated alloy steels of high strength in moving vehicles.

—**Metallurgical Laboratories, Inc.**
1116 W. Montgomery Ave., Philadelphia



Recent Alloy Steel and Iron Developments

THE iron and steel industry has recently felt the stimulating influence of several outstanding developments which have considerably widened the scope of application of alloy steels and irons. The introduction of "chromansil" steel, which contains relatively small amounts of chromium, manganese and silicon, brought to shipbuilders, bridge designers, and allied engineers a low alloy steel with high physical properties which can be used as-rolled. Since it can be readily fabricated, welded and riveted, the possibilities for its use for engineering purposes are unlimited.

A new chrome-vanadium nitriding steel, which combines great hardness with good strength and ductility, has widened the field of use for nitriding steels. Characteristics of this steel show advantages not found in other types.

It has been found that the quality of open-hearth steel can be considerably improved through the use of a deoxidizing alloy containing silicon and manganese in the proper proportion to produce a rapidly rising slag.

High-chrome cast iron, containing up to 30 per cent chromium, is arousing interest because of its remarkable resistance to oxidation and growth at high temperatures. The possibilities of utilizing this iron to replace ordinary gray iron for high temperature work are widespread.

Other chromium alloy steels such as 3 per cent chrome steel and 5 per cent chrome steel have been developed, and exhaustive tests are being made of their advantages which result from their increased strength, wear and corrosion-resistance.

Foundrymen have received with favor ferroalloy briquets of silicon, manganese or chromium for cupola additions of these alloys to cast iron. Ferroalloy briquets reduce oxidation losses to a minimum and provide an easy and positive method of making accurate alloy additions.

—**Electro Metallurgical Co.**
30 East 42nd St., New York



Fuel Proportioning and Safety Valves

IMPORTANT progress has been made in the control of furnace atmospheres and temperatures. The instrument companies and manufacturers of actuating devices for automatic controls have taken long strides in the development of control motors of the anticipating, reversing, multiposition and proportioning types.

It was found, however, that the old combination of an

air valve and a fuel valve which would proportion the fuel and combustion air at two settings fairly well, in conjunction with motors of the former two position high and low fire type, were not sufficient for use with these new types of control motors. Devices were required which would correctly proportion the fuel and air at any point within the range that the instruments and control motors might call for.

To meet these requirements, our company has developed a line of proportioning gas and air mixers and proportioning gas and air valves. Among these are proportioning oil and air valves.

Other important steps have been in the development of safety devices for the prevention of furnace explosions. One of these, a North American duplex automatic safety shut off valve of the double diaphragm type, is unique in that with combustion systems using air from a blower it will automatically shut off the gas or oil if either these or the air supply should fail.

—**North American Mfg. Co.**
2910 E. 75th St., Cleveland



Progress in Molybdenum Heavy Duty Cutting Steels

MOLYBDENUM steels as a substitute for tungsten high-speed steels of the usual 18-4-1 type are gaining increased attention. This company and the Universal Steel Co., Bridgeville, Pa., have jointly developed a molybdenum heavy duty cutting steel that is making increased progress in the tool steel trade.

This material is being marketed under the trade name "MoTung" and was described in *THE IRON AGE*, June 9, 1932. Field tests are substantiating laboratory results that have shown better performance than steels of the 18-4-1 type. In addition to good performances in service tests, the material is appealing to the buyer through definite economies experienced by reason of lower materials costs and lighter weight.

The new steel is of further interest because of lower hardening temperatures that are employed, it being satisfactory to use hardening temperatures approximately 150 deg. lower than those used for tungsten high-speed steel.

—**Cyclops Steel Co.**
Titusville, Pa.



Scratch Extensometer, Hydro Gas Accumulator, Hydraulic Test Controls

WE have three developments that we think are worthy of a place in this résumé of *THE IRON AGE*.

One of these is the "Scratch Extensometer," recently announced in the technical press. This instrument, weighing less than an ounce and hardly larger than a teaspoon, records tension-compression strain and shear strain under certain conditions. It may be attached to light and heavy structures and its cost is such as to permit wide use and adoption.

The second development is a hydro-gas accumulator system of hydraulic power supply in which "bottles" partially filled with inert gas or compressed air replace the

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conventional weighted accumulator. With this system a small motor and pump will supply large energy demands over short periods.

The third development is an automatic control for hydraulic testing machines which incorporates not only the ability to maintain given loads over long periods but also permits testing at a constant rate of strain. Neither of these purposes could be properly attained before.

—**Baldwin-Southwark Corpn.**
Philadelphia



Steels for Cutting Woods and Other Non-Metallic Materials

DURING the past few years an increasing number of new non-metallic materials have found application for engineering and constructional purposes. The so-called "plastics," the many composition boards, the glued plywoods, are typical. New woods from the tropics are being introduced and refinements in the working of old woods are being made.

The introduction of the newer materials to be cut and sawed has produced important metallurgical problems to develop satisfactory tool materials. They have shown us how little we really have known about the action of cutting edges in service. Paradoxically, some of the softer materials are the hardest to cut.

The better knowledge of the physical properties required in a cutting edge has given information which will result in the near future in important improvements in steels for cutting woods and other non-metallic substances. In some cases the increased service will be accomplished with an actually less expensive steel. In other cases the higher first cost will be more than offset by longer life.

—**Henry Disston & Sons, Inc.**
Philadelphia



Larger Use of High-Alumina Brick

HIGH-ALUMINA brick containing approximately 50, 60, 70 and 80 per cent alumina, having properties which better fit them to meet specific requirements, have advantageously replaced first quality fireclay brick for certain important applications in the steel industry—for example, the well wall and top checker courses in blast furnace stoves, the top checker courses and water-cooled ports in open-hearth furnaces. In many plants in the steam power field, they are standard for the side walls, arches and bridge walls of boiler settings where certain types of slag are encountered and which more readily react with first quality fireclay brick.

The alkaline ash from oil fuel is less destructive to high-alumina brick than to first quality fireclay brick at the extremely high temperatures commonly employed. High-alumina brick are therefore finding application in oil-fired boiler settings and in the settings of high temperature cracking units in the oil refining industry. They are proving an economy in the ports and checkers of glass tanks. Still another application is in the field of non-ferrous metallurgy—for example, in lead softening and refining furnaces. High-alumina brick to a very large extent have supplanted fireclay brick in the burning

zones of rotary kilns used for burning dolomite, magnesite, lime and cement.

Of particular advantage to the open-hearth steel industry and in the field of non-ferrous metallurgy is the progress in the development of chrome brick of low spalling tendency and greater strength at high temperatures.

Similar developments in the manufacture of magnesite brick have likewise effected economies. Magnesite brick of relatively low iron content when used in service involving extremely high temperature, due to flame impingement, have given improved service over that secured with regular magnesite brick of higher iron content. They are becoming more generally used in furnaces employed in the metallurgy of copper and other non-ferrous metals.

Research has helped considerably in the selection of high temperature bonding mortars and special ramming mixtures to meet specific service conditions.

—**Harbison-Walker Refractories Co.**
Pittsburgh



Continuous Strand Heating Applied to Wire and Strip Sheet

GENERAL acceptance of the principle of "individual heating" as typified by continuous strand heating applied to general production requirements of wire and strip sheet in both ferrous and non-ferrous industries constitutes one of the outstanding features of the year, in our opinion.

Continuous strand heating has been used in specialty heating operations—in the "patenting" of steel wire, lead pot hardening of steel wire and narrow steel strip, etc., but for large scale production in the annealing of wire and strip metal, in steel, brass, bronze, German silver, etc., heating operations have been conducted on the material in the form of large coils.

Continuous strand heating furnaces may be arranged for bright or clean annealing, resulting in good surface condition. For material not bright annealed, continuous pickling machines may be arranged in line with the furnace equipment, resulting in a one-handling annealing, pickling, washing and drying. Operating time is short, permitting quick deliveries and requiring less material in process.

—**W. S. Rockwell Co.**
50 Church St., New York



Developments in Coated Electrodes—Portable Hood Electric Furnace

TWO developments of a revolutionary nature in the field of arc welding are announced and will be described in a paper to be presented at the National Metal Congress by L. R. Leveen of this company. The first is a device for automatically feeding a heavily coated electrode to the arc, and controlling the arc length. The second is an electrode with a heavy coating of such a nature that the electrode can be produced in long lengths and coiled and uncoiled without causing the coating to flake off. Thus are made available for the first time the combination of the full advantages of automatic welding with the high quality weld obtainable from the heavily coated electrode.

We have developed an electric furnace of a portable

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hood type which is especially useful in annealing coiled wire, strip and tubing. Several bases are provided with each furnace, each base having a motor-driven fan. The load is covered with a sheet metal hood. The fan serves to circulate the atmosphere within the hood during both the heating and cooling cycles, facilitating the transfer of heat to and from the charge and greatly increasing the furnace output. Through the cooling cycle the heating chamber is removed from the hood and placed over another which is charged, ready for heating. Any desired gas atmosphere may be used within the retort.

—General Electric Co.
Schenectady, N. Y.

New Cutting and Corrosion-Resistant Alloys

AN improved grade of Haynes stellite cutting tools, known as J-Metal, has been developed by our organization. At the speeds, feeds and depths of cut normally used with Grade 3 Haynes stellite, the new J-Metal gives from two to four times as many pieces per grind. Operating 30 to 50 per cent faster, J-Metal produces just as many pieces per grind as produced by grade 3 at the slower speeds. These production figures have been proved by many tests on production jobs during the past few months and standardization on the new tools by the majority of production shops.

There is also offered a comparatively new series of corrosion resisting alloys, possessing high resistance to a wide variety of chemicals. Three of these alloys known as Hastelloy A, C and D, have already been introduced and it is understood that a fourth alloy will be available soon. The new alloy will be particularly designed for withstanding the action of boiling hydrochloric acid.

The Hastelloys make excellent castings, are readily welded, and in certain grades can be rolled and forged. They are thus available for fabricating many kinds of acid and corrosive reagent containers, valves and handling equipment. The ability of the Hastelloys to withstand corrosion provides opportunities for substantial economies to the chemical industry.

—Haynes Stellite Co.
Kokomo, Ind.

Hydrocarbon Gases for Carburizing and Other Uses

AN important change in carburizing operations at large industrial plants is indicated in the installation of several large production type continuous gas furnaces for carburizing such parts as camshafts, gears and pinions. These new furnaces use paraffin hydrocarbon gases (such as butane, propane or methane) for both the heating fuel and the carburizing medium, and have proved quite successful in producing high quality products at extremely low cost.

The increasing use of butane as a fuel gas for large stationary engines generating electric power may bring about generally decreased costs for electrical energy. Industrial plants having butane installations for their various heating operations can, in many cases, profitably use the same installation to furnish butane to the engine-generator sets.

The paraffin hydrocarbon gases such as butane, pro-

pane or methane (natural gas) have found many new and advantageous uses when burned through the newly developed diffusion or luminous flame burners. Under such conditions these gases will produce, at forging heat, scale-free billets for pressing, rolling, forging or upsetting operations.

—Philgas Co.
Detroit

Increased Gas Usage Aided by New Controls

MOST modern industrial processes, requiring the use of heat, demand precise regulation of temperature and flexibility of control. The advantages of gas for this use are obvious.

We have devoted much time and study to the development and refinement of apparatus necessary for adapting this fuel to industrial requirements, and have developed several types of mechanical and electrically operated controls with this end in view. Special attention has been given to the safety factor and several types of valves have been brought out which will shut off the supply of gas in the event of a pilot failure.

The design of this apparatus places at the disposal of industry the flexibility of control and close regulation of temperature required, together with complete safety of operation. As a consequence a more general use of gas as a fuel is anticipated.

—Partlow Corp.
New Hartford, N. Y.

Die Castings of Aluminum and Silicon Bronze

CENTRIFUGAL pump impellers of the enclosed type, die cast in silicon bronze with sand cores, illustrate a striking advance in the production of this type of casting. The accuracy with which the cores are held in the dies insures uniformity and running balance, while the die cast surfaces eliminate most of the machining operations.

Die castings of aluminum and silicon bronze illustrate a wide range of mechanical applications, we believe. They are exceedingly strong (over 80,000 lb. per sq. in. tensile strength), remarkably free from porosity and oxide inclusions, and very high in resistance to corrosion, abrasion and fatigue. Die cast gear and worm blanks demonstrate the advantages of this method of manufacture.

—Aurora Metal Co.
Aurora, Ill.

Special Brick to Meet Severe Conditions

THE manufacture of low-carbon and alloy steels in the open-hearth furnace imposes severe conditions on some of the refractories used in the furnace construction. With the object of extending the intervals between repairs, many operators are replacing silica bricks in the exposed sections of front walls with more refractory materials. In several 150-ton furnaces, "Ritex" brick, chemically bonded, hydraulically pressed, unburned magnesite bricks, have proved more economical than other commonly available refractories, we have found.

The prevalent use of gaseous atmospheres, notably

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carbon monoxide, to improve forging and heat-treating practice demands a more careful choice of refractories for furnace linings. Improperly burned clay bricks readily disintegrate in reducing atmospheres.

Intermittent operation of electric furnaces, due to interrupted production schedules, often causes excessive cooling of the silica roofs and a consequent reduction in roof life. Where excessive cooling cannot be eliminated, roofs built of high-grade clay brick have proved economical.

—General Refractories Co.
Philadelphia



Mild Steels Successfully Cut With Carbides

THE application of tungsten carbide to cutting operations has opened the way to a new field in metallurgy which may be called "powder metallurgy." It is based on the sintering of mixed metallic powders—one hard and not easily melted, with a tougher metal of lower melting point. The cemented carbides in practical use today consist of tungsten carbide or tantalum carbide as the hard metal, held in a tougher metal binder, usually cobalt.

When we first offered Firthite, three years ago, it was recommended for cast iron but for little else. Gradually additional forms were evolved, each suitable for operating on certain groups of materials.

Strangely, it was ordinary mild steel that offered the most puzzling problem. The earlier types of cemented carbides were unsuccessful on steel because a chip cavity would wear rapidly behind the cutting edge of the tool. Recent research, however, has produced a form of Firthite that overcomes this difficulty.

The types of Firthite now available cover machining requirements on practically all of the materials commonly used in industry. In another form it has been found excellent for the nibs of drawing and extrusion dies.

—Firth-Sterling Steel Co.
McKeesport, Pa.



Tank Maintenance Reduced in Line with Times

UNDER present operating and sales conditions it is particularly necessary to curtail maintenance expense. This should not be done by letting plant equipment run down, but rather by selecting so as to avoid frequent replacement.

In pickling, plating and other operations where equipment is subjected to acids, leakage, frequent replacement and shut downs all affect the overhead unfavorably. To enable tank users to reduce this expense, our company has developed and produced "Basolit" tanks which permit of continuous use and which minimize replacement expense as well as eliminate leakage.

—Nukem Products Corpn.
70 Niagara St., Buffalo



Recent Developments With Titanium

RECENT metallurgical developments with titanium include the offering of titanium metal of 99 per cent purity and of pure nickel-titanium alloys, which are expected to have a field of use in radio-tube parts. The use

of titanium as an alloying element in austenitic steels, as well as for deoxidation and scavenging, is increasing.

Another application of titanium, on which considerable research has recently been carried out, is in gray cast iron. The detailed results of this work will probably be published soon. By means of an easily fusible alloy of titanium, containing but little carbon or aluminum, definite amounts of this element can be incorporated readily in cast iron with interesting effects. The refining action on the size of graphite flakes is stronger than that of other alloys which have been tried in comparison, such as nickel, chromium and molybdenum, and an increase in strength results.

Titanium is found also to promote graphitization rather than carbide-formation, so that like nickel it lessens the tendency toward hardening of the iron at the edges of thin sections. For the same reason, a weakening effect may be experienced due to graphitization and ferrite formation in the iron, and if too much is added to iron of rather high silicon content the presence of too much ferrite may counteract the effect of the finer graphite so that little or no strengthening is obtained. The best results may, therefore, be expected by adding titanium to rather low-silicon irons.

—Titanium Alloy Mfg. Co.
Niagara Falls, N. Y.



Cadmium in Iron and Steel Preservation

THE Grasselli Chemical Co. has for many years been actively interested in the chemical treatment and processing of iron and steel. As a result of this interest the company is continually pioneering in the fields of "conservation and preservation" of these materials.

Highly efficient inhibitors, simple in their use and application in the process of pickling iron and steel, are one result of our company's interest in the "conservation" field. Its improvement in the quality and use of zinc and the advent of Grasselli, "Cadalyte," both of which are rust and corrosion preventives, are two results of its interest in the "preservation" field.

Cadmium, once a laboratory curiosity, is now an important by-product of zinc. This has opened up a large field in the preservation of iron and steel, in which the development of the product and process "Cadalyte" is taking a leading part.

—Grasselli Chemical Co.
Cleveland



New Insulating Brick for High Temperatures

IN the past few years many improvements have been made in construction and design of industrial furnaces which have resulted in large savings by fuel conservation. Insulation has played a most important part in these developments. Its use has helped to effect a material saving in fuel, increased furnace capacity due to more rapid and uniform heating and has decreased the percentage of imperfect products. Temperature control within the furnace and improved working conditions about the furnace are provided, thus permitting men to work more efficiently. Addition of a new type of insulating brick by the Armstrong Cork & Insulation Co. now per-

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mits this company to offer a special material for the various conditions encountered in the high temperature field.

The new brick, known as Armstrong's "EF" brick, was developed as an insulating material particularly adapted to electric furnace use where one material will serve for both structural and insulation purposes. Armstrong's EF brick is burned at 2100 deg. F., and can be used where temperatures will reach this point. It is particularly adapted for use where an inner plastic refractory such as Sillimanite or Adamant is to be put in place.

—**Armstrong Cork & Insulation Co.**
Lancaster, Pa.



The Electric Eye and the Electric Furnace

THE electric eye as used in controlling furnace temperatures within a limit of 20 deg. F. variation promises to become one of the outstanding improvements in heat treating.

The temperature of a furnace, as is well known, does not represent the temperature of the piece being heated. It is impossible, at the present time, to determine the temperature of steel being heated other than through the use of a reading glass, and the human element enters into this method.

Through the electric eye, however, it is possible to provide automatic control within the limits stated above. The apparatus may be set to operate a switch when a predetermined temperature color is attained by the piece, thus making it impossible to either overheat or underheat.

The electric eye is applicable to electric furnaces using the resistance method. It cannot be applied to coal, gas or oil-fired furnaces.

At the National Metal Congress we shall demonstrate the electric eye in connection with our single electrode, type G forging heater.

—**American Car & Foundry Co.**
30 Church St., New York



Developments in Resistance Welding

THE development of range boiler resistance welding equipment opens up a totally new field of vast possibilities to the resistance welding manufacturer. We see this developing into an extensive business for the manufacture of air tanks, oil containers and gasoline drums, for garage work, repair shops, etc.

The development of four units of resistance welding equipment for the manufacturer of pails and containers, consisting of flash welding, flash stripping, spot welding and seam welding also opens up an enormous field for the applications of resistance welding equipment.

Third on the list would be perhaps shovel welding equipment, which is an application of resistance welding to one of mankind's earliest and most useful tools.

The steel age has now ushered in the necessity for light, strong, sturdy steel flooring and welding equipment weighing some 30 tons is now under the course of construction for patent steel fabricated resistance welded flooring.

Recent developments indicate the practical method of making steel forms, which are driven down to bedrock and

filled with concrete for piling, is by electrical resistance welding methods.

Another great field for resistance welding equipment is opened up by the development of resistance welding equipment for the manufacture of burial vaults and all-steel caskets.

Hollow steel balls of stainless steel and carbon steel are now being manufactured which are much lighter than the solid balls and give better hardening conditions.

Resistance welding equipment for the manufacture of steel mats, for concrete reinforcement work and road building is another large resistance welding field.

Welding equipment for welding sheets for continuous sheet rolling mills runs to mobile equipment running on ordinary railroad tracks weighing 70 to 80 tons; in fact electrical resistance welding methods are everywhere taking good sturdy root in the modern industrial field.

—**Federal Machine & Welder Co.**
Warren, Ohio



New Gas Generator Has Wide Application

A DEVICE for changing No. 1 furnace oil into its gaseous state and mixing the gas thus formed with air in the exact proportion for perfect combustion has recently been placed on the market by the Railway Locomotor Co., a division of the Ryan Car Co., Chicago. This device is known as the "Vapofier."

Already more than 100 industrials in 38 lines of business have found the vapofier both economical and efficient. It is being used for steel heat treating, carburizing, forging, annealing, japanning and enameling, core baking, die casting, coffee roasting, etc.

A large tool manufacturer in Chicago advises that there is less shrinkage, less distortion and less formation of scale on work from furnaces fired with this device than from the same furnaces fired with other gaseous types of fuel. Carbon dioxide meter readings show that conditions approaching the theoretically perfect combustion are secured with the vapofier. These conditions are not only easily maintained, but can be duplicated whenever necessary, thereby reducing the chances of defective or imperfect work.

—**Railway Locomotor Co.**
59 E. Van Buren St., Chicago



New Type of Mineral Coated Electrodes

A NEW product, introduced by us about a year ago, is the Murex heavy mineral coated electrode. Manufactured by the American Murex Corp., for whom the Metal & Thermit Corp. acts as exclusive sales agent, Murex electrodes are made 18 in. long and in types and sizes suitable for a wide range of horizontal, vertical and overhead welding operations.

An outstanding feature of this electrode is the patented spiral winding of asbestos yarn which serves to hold the heavy mineral flux to the core so that it is not injured if the electrode is bent. The manufacturer points out that the all-mineral ingredients of the flux on a Murex electrode cause it to burn without objectionable fumes or smoke, while the thickness of the coating enables the

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operator to ride the electrode on the work, thus letting the flux space the arc.

Among the eight types of electrodes in the Murex line there are electrodes for welding commercial mild steel, manganese steel, 18-8 rustless, and rustless iron.

Of special interest to street railroad executives is the new method of Thermit welding under traffic installed on most of the large electric railroad properties of the United States within the past year. This new method of welding, we think, has successfully solved the maintenance problem of rail joints.

—**Metal & Thermit Corpn.**
120 Broadway, New York

Thermostatic Bimetal Developments

THE use of thermostatic bimetal has been greatly enhanced by developments during the past few years in steel alloys. Over a period of 30 years, thermostatic bimetal has developed from a novelty metal into an important item of trade as evidenced by the fact that hundreds of thousands of pieces are in use and the sale of this material is in excess of over one-half million dollars per year.

Thermostatic bimetal requires alloys which have relatively wide thermal expansion coefficients in order to obtain as much bending as possible due to temperature change in the fabricated product. The two component metals have to be similar in their physical characteristics in order to respond uniformly to welding and rolling.

Many high temperature applications require material to endure at temperatures up to red heat. It has been through experiment and study on the part of metallurgists that alloys have become available for this use resulting in the economical production of bimetal for the general trade with a high degree of accuracy and endurance.

—**W. M. Chace Valve Co.**
1600 Beard Ave., Detroit

Four Minutes Between Heats in Top Charging Furnace

ONE of the newer developments in connection with Lectromelt furnaces, especially of the steel works type, is the top charge design which has been applied to a number of our recent furnaces.

In the Lectromelt top charge type furnace, the furnace roof and superstructure, which includes masts, electrode arms, electrodes, etc., are raised a suitable distance hydraulically or otherwise and rotated to one side so that the furnace may be rapidly and conveniently charged in one load by a crane handled drop bottom type charging bucket. With this type of furnace and "one shot" charging, delays between heats are at a minimum. One user of a 10-ton capacity Lectromelt top charge furnace reports averaging only 4 min. between heats—this time including the tapping of the 10-ton heat in the furnace, charging another 10-ton heat and power on, ready to start again.

There have, of course, been numerous other improvements, such as specially designed tap changing gear for

the main transformer, improvements in details of the construction, etc.

—**Pittsburgh Lectromelt Furnace Corpn.**
Pittsburgh

New Alloy Steel Tubing for Refinery Use

THE research department of The Babcock & Wilcox Tube Co. fostered the addition of molybdenum to 4 to 6 per cent chromium steel tubes and has produced a real improvement in alloy tubes for refinery service. The metallurgical soundness of this addition of molybdenum has been conclusively proved within recent months in the wide adoption by the refining industry of 4 to 6 per cent chromium steel containing 0.40 to 0.65 per cent molybdenum for seamless cracking coil tubes.

The forerunner of this alloy steel, i.e., straight chromium steel, had the drawback of low creep strength and a tendency toward development of brittleness in service. The addition of molybdenum has remedied the embrittlement trouble and considerably increased high temperature creep strength at but small increase in cost.

With good resistance to oil corrosion at elevated temperatures and other desirable properties, both from the manufacturer's and user's viewpoints, it is confidently expected that increasingly larger tonnages of this alloy will be used by the refining industry.

—**Babcock & Wilcox Co.,**
85 Liberty St., New York

Expanding Applications of Magnesium Alloys

MAGNESIUM alloys are now fulfilling the many predictions made regarding them. The transportation industries continue to be their largest users. Aircraft applications are increasing, both in number and volume, and now include parts made from sheet and structural sections, as well as motor, wheel and miscellaneous castings. Sheet for structural sections is finding still wider use in bus, truck and trailer construction. Several large manufacturers of portable tools and equipment are finding satisfaction in the use of magnesium alloys. Particularly interesting is their application in foundry flask, pattern and core box construction where lightness, ease of finish, and ease of parting from sand are important. Bread peels constitute an application in the baking industry. They are both lighter and much longer lived than the older wooden peels.

These expanding applications are the direct result of numerous factors. The cost of both metal and fabricated parts has been greatly reduced. Castings, structural shapes, and sheet are becoming more available. Improvements in rolling technique are being reflected in better physical properties and forming characteristics of sheet metal. The development of chrome-phosphate and chrome-pickle treatments as paint bases has greatly improved the protective action of paints, varnishes, and lacquers. Heat-treated castings are now available with greatly improved yield strengths. Performance in service is substantiating laboratory experiments to prove the stability and utility of magnesium alloys.

—**Dow Chemical Co.**
Midland, Mich.

Controlled Cooling for Heat-Treating Furnaces

BY A. N. OTIS

Industrial Engineering Department,
General Electric Co.,
Schenectady, N. Y.

ELECTRIC furnaces are inherently slow cooling, as they are well heat-insulated and are provided with thick walls to reduce the losses to a minimum.

This is a valuable characteristic for most heating operations, but for some annealing processes it is desirable to cool the material out of contact with air for the purpose of preventing oxidation or decarburization, or to avoid too rapid cooling of the work.

Three Cooling Methods Developed

Means have recently been developed to accelerate the cooling by extracting heat from the furnace by means of external apparatus, the rate of cooling being adjustable and therefore under control. Three methods have been developed and put into use, the means employed depending on the nature of the work.

These may be outlined briefly as follows:

1. Alloy tubes or pipes are installed in the heating chamber. Air may be supplied from a blower. The air passes through the tubes and is discharged into the room. This method

MORE complete control of the heat-treating process is obtained through regulated cooling of furnaces. Such control is sometimes advantageous in preventing oxidation or decarburization, and is useful in shortening the cooling period. Three methods of regulating cooling are described in this article.

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extracts heat from the furnace chamber without admitting air to the chamber or into contact with the work, and is applicable to the more common forms of annealing furnaces in which normal air is the atmosphere. It may also be used with furnaces to which an artificial atmosphere is supplied.

2. A recirculating system is provided for furnaces containing an artificial atmosphere, such as hydrogen. In this method, applicable particularly to large furnaces, the gas is drawn from the furnace through a surface

cooler by means of a suitable blower and duct system, the cooled gas being returned to the furnace.

3. A fan is installed in the furnace chamber, the fan circulating the atmosphere over the charge. This method is particularly well adapted to smaller furnaces of the cylindrical type for bright annealing, in which a cover hood is employed for the work.

As an example of the first method, reference may be made to Fig. 1, which shows an electrically heated car-type furnace equipped with a forced cooling system. The cooling system consists of a series of alloy tubes across the roof of the furnace, spaced approximately a foot apart for the entire length. The tubes are formed into a flat "U," the arms extending upward through the roof, one end of each tube being connected to a header which is supplied with air from the blower, and the other end being open to the room.

The furnace shown is used for annealing castings and forgings, and it is usually necessary to allow some slow cooling in the furnace, after which the heat may be extracted somewhat more rapidly, but it would not be permissible to remove the

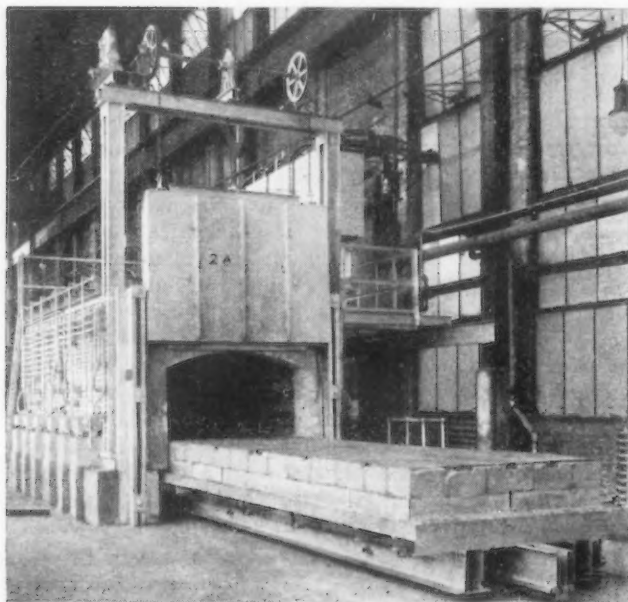


FIG. 1—Car-type furnace (at left) with chamber 18 ft. long by 6 ft. wide, for annealing forgings and castings, equipped with a cooling system.

FIG. 2—Typical cooling curve (below) of the furnace shown in Fig. 1. The load consisted of 13 tons of forgings.

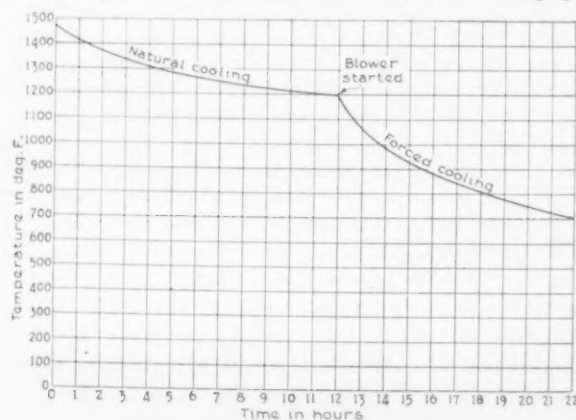


FIG. 3—Two 50-ton rectangular pit-type furnaces for annealing bar stock 25 ft. long, with gantry crane for lifting covers and moving them aside. Loading cradles for the stock and the lifting fixtures are shown in foreground.



forgings to the open room for cooling until the temperature has been further reduced. Fig. 2 shows a typical cooling curve for a load of 13 tons of forgings in this furnace.

The furnace is further provided with a series of covered ports along each side at the bottom, and a similar row along the center at the top. Opening these ports permits air to circulate freely through the furnace and thus to further accelerate the cooling.

The materials and features of design employed take advantage of newly developed materials, such as semi-refractory brick and seamless alloy tubing, both of which have recently become available. Their use allows greater freedom in the design of furnaces than was heretofore possible and enables them to be adapted to specific purposes with great accuracy.

For example, it permits the establishment of definite heating and cooling schedules to take advantage of night rates for power. It is often practicable to operate electric furnaces during the night hours without increasing the electrical demand of the plant, and, in other cases, public utility companies offer attractive rates for power used during the night hours. With types of furnaces that can be designed for definite heating and cooling cycles, it is possible to meet the imposed conditions with a high degree of accuracy.

Fig. 3 shows a pair of large rectangular pit furnaces, with a similar forced cooling system, for annealing bar stock of alloy steel, 25 ft. long. The stock is supported in cradles of

heat-resisting alloy, the cradles being lifted by a suitable fixture from the shop crane and put into the furnace.

Each of the loaded cradles will hold 25 tons or more of bar stock, and two cradles are loaded per charge, making loads of 50 tons.

The cooling tubes are located in the cover and are supplied with air from a header extending along one side, as indicated in Fig. 3. A suitable resilient joint is provided between the

header connection and the blower discharge, so that a tight joint is made when the cover is in position. When the ports along the side are opened to permit the free circulation of air, the main furnace cover is lifted slightly so that the air will pass out through the open joint.

Elevator Furnace Uses Hydrogen

As an example of the second method, reference may be had to Fig.

FIG. 4—Elevator-type furnace with recirculating cooling system for the atmosphere, used for annealing silicon steel sheets and punchings in atmosphere of hydrogen.

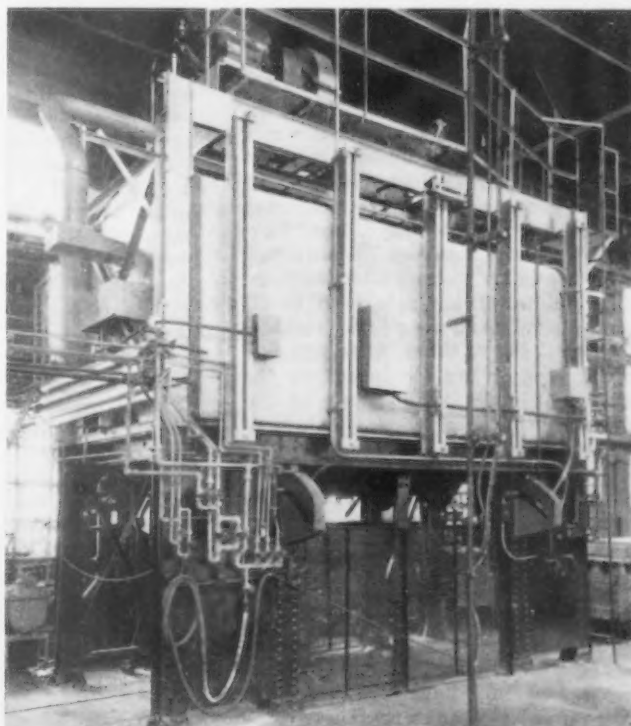
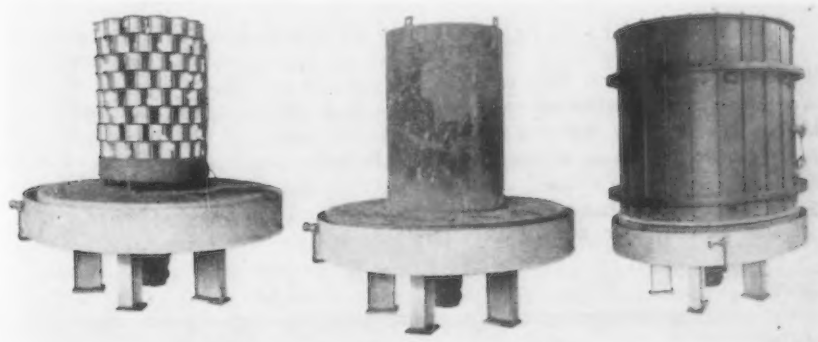


FIG. 5—Bell-type furnace employing cover hoods and circulating fans, for bright-annealing copper and steel wire or strip.



4 which shows an elevator-type furnace equipped with a recirculating cooling system for the atmosphere, for which hydrogen or other similar gas may be used.

The cooling system consists of a tubular finned surface cooler, with water flowing through the tubes, and a suitable blower and duct system by means of which the gas is drawn from the furnace, through the cooler, and is delivered again to the furnace, maintaining a continuous circulation.

(Concluded on Advertising Page 18)



Cost of Government Must Come Down

By A. I. FINDLEY
Editor Emeritus, The Iron Age

Government cost is enormous and inexcusably wasteful.

Federal, State, county and municipal taxes—all must be cut with a heavy hand.

First of a Series Depicting the Tax Problem and the Steps Toward Its Solution

Never were the American people so much of one mind as on these two judgments. But along with that unanimity there is in some quarters only a vague sense of the price that must be paid in time, effort, organization, education and relentless purpose, to compel those who govern to stop wasting the people's money.

Tax complaints are as old as taxes. To have taxes linked in the common mind with the inevitability of death has doubtless saved tax-layers times without number from a righteous reckoning at the hands of tax-payers. The first citizen ever to sign himself "Taxpayer," as he fulminated in his local newspaper against the high cost of living under a town council, may have been taken seriously. But "Taxpayer" as the final and identifying word in a letter to the editor long ago wore out its efficacy as a spur to official action. And in all the reckless boom that burst three years ago our citizenry were far too intent on the pursuit of quick wealth and on the enjoyment of things for which they had sold out their future to give heed to the steep ascent of the cost-of-government curve in the years since the war.

The Modern Old Man of the Sea

Now, all over the country is an awakening to the inequities—not to say iniquities—of tax burdens that bear down the people as the Old Man of the Sea bore down on the weary back of Sinbad the Sailor. There came a day when Sinbad found a way to rid himself of the Old Man of the Sea. And today long-suffering American taxpayers seem about to demonstrate that the anger of a patient public like that of a patient man is a thing to beware of.

In no other depression has the cost of government been so forcibly held up to business, big and little, as a factor in its own cost. For the first time, in the records of causes and effects of American panics and business reactions, as economists have written of them, rapidly rising government

expenditures are now listed among the major ills from which industry and finance are suffering. It has been brought home to the millions of unemployed that excessive cost of government has operated powerfully to take away their jobs.

Nothing was so disheartening, in the deepest of the gloom that overhung all business in May and June, as the spectacle of a Congress that for weeks ignored the mandate of the nation for an economy in Government expenditure like that to which the vast majority of the people had been forced by a calamitous loss of income. Never did American business men get a clearer call to make themselves felt in the shaping of Government policies than that which came from Washington in that crisis. Never before did an American President feel called on to say in effect and publicly that both the action and inaction of Congress were a threat to the nation's credit, and thus to stir the people to demand that Congress squarely face its duty and balance the budget. Little wonder that fear for the American dollar ruled every department of business when in less than four months three billions of treasury raids had clear majorities in the House of Representatives.

While the immediate perils of those trying months have been averted, there should be no illusions as to the gravity of the tax problem. Repre-

sentative McDuffie, of Alabama, chairman of the Special Economy Committee of the House, in saying recently that at least \$600,000,000 must be cut from Federal expenditures in the next two years (only \$150,000,000 was saved by the economy bill for 1933), warned that if Governmental expense is not cut down, the business depression will not end and even may be intensified. "We are facing a situation," he added, "from which no one—Federal official, member of Congress or private citizen—can turn away. The Government faces the same economic extremities that confront private business, industry, and even the home. This is a time for united action and unstinted cooperation. . . . The burden of taxation is properly placed upon wealth, yet taxes placed upon the rich are usually, in the last analysis, passed on, with the result that practically every citizen, be he ever so humble, pays his part of the cost."

The country has been told that when Congress adjourned in July it had balanced the budget for the fiscal year ending June 30, 1933. Already it is plain that the taxes now in force will fall much short of the budgeted outgo, and from the membership of both houses at Washington have come predictions that new sources of revenue must be found in the coming winter.

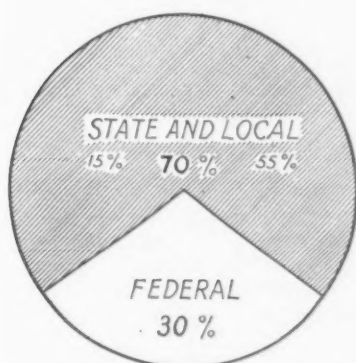
Surprise, not only at the stupendous size of the nation's tax bill but at the

WAR TAKES 72 PER CENT OF FEDERAL OUTLAY

	Per Cent of Total
World War debt (interest 16%, principal 13%)	29
War pensions, compensation and veterans' care	27
Military defense (Army, Navy and Marine Corps)	16
Public construction (roads, buildings, rivers and harbors)	9
Post Office Department deficit	4
Executives, Congress, law enforcement, agriculture, fiscal administration, commerce, industry, labor, etc.	15
	100

speed at which it has grown, is first in the emotional response of the public to its recent discoveries about Government cost. Farm land values have shrunk woefully. Prices of farm products are below a living level. Real estate all over the country has depreciated a fourth to a half or more. Prices of commodities have fallen more than 35 per cent since the depression came. Earnings of industrial labor (not the rate, but the sum total) are down 50 to 60 per cent.

Before the recent rise, the great mass of stocks and bonds—the exceptions were notable—were selling at



OF about \$15,000,000,000 of total annual taxes in the United States, 70 per cent is State and local and roundly 30 per cent is Federal.

10 to 50 cents on the dollar. Yet with all this cataclysmic destruction of wealth and incomes, involving alike industry, commerce, banking—capitalist, industrial worker, farmer, every earner of salary or wage—Government expenditure, grown since the crash of 1929 and still growing, towers menacingly.

A Nation-Wide Cry for Relief

The heat of the tax aroused citizen is not to be allowed to cool. All over the country chambers of commerce, tax leagues and citizens' protective committees are at work, and hundreds of new organizations have sprung up to inform the people and to make their will known to officials, State, county and city. Congressmen heard from more of their constituents in the first half of 1932, it is safe to say, than in any like period in their official life, all putting in decisive terms the call for immediate and drastic economies. Trade associations, national, State and local, are making Government cost cutting their major activity. Thus far, at least, as a clipping service test no doubt would show, the campaign for tax reduction has had a larger place in newspaper space than the campaign for the Presidency.

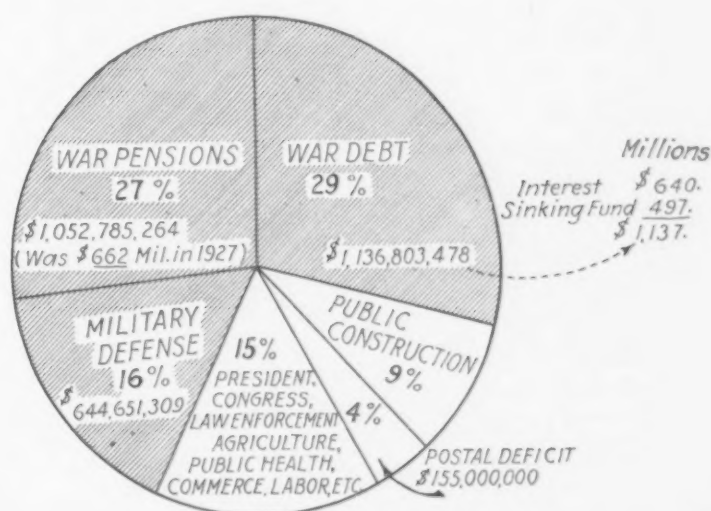
American business men seem to be taking the measure of the job ahead of them. They have started by hammering away with effective rousements on the astounding growth of

Government outlay under the squander system of these years last past.

Simple Subtraction vs. Complex Increase

Finances of the average American family, as it now peers into the fourth year of business decline, are not complex. The figures dealt with have shrunk greatly since 1929. It is a simple "example" in subtraction, linked up to the difficult problem of managing to get along on what remains of the minuend. But when the intelligent householder seeks to know why his tax bill is so high, when his income has fallen so low, and why his cost of living has followed his income only part of the way down complications begin at once. Confronting him are bewildering details of economics and government functioning, that with their intricacies and contradictions seem to leave him as much without help as without hope.

In the campaign of education now



DISTRIBUTION of the Four Billions of Annual Federal Outlay; 72 Per Cent Goes to War Pensions, War Debt and Military Defense.—Diagram from a forthcoming chart of the National Association of Manufacturers, based on data from Government sources.

being pushed on so many fronts, stress has been put everywhere on the way increase of Government cost has been outrunning increase in national wealth and national income. It is not so many years since an expiring Congress was held up as an arch profligate for being the first billion dollar Congress in American history. The appropriations of the last Congress for running the Government went well over four billions.

Every Dollar in Four a Tax Dollar

In 1913 Government costs, Federal, State and local, were 8 per cent of the national income.

In 1924 they were 11.5 per cent of the national income; in 1928 they were 14 per cent of the national income.

In 1930, with all taxes estimated at 13.5 billions and national income at 71 billions, the percentage of Government cost had risen to 19.

In 1931 national income had fallen to 55 billions, while taxes were more than 14 billions. So that one dollar out of every four received by the American people last year in wages, salaries and return on investment was taken from them in Federal, State and local taxes.

As 1932 income has been falling, the rise of Government cost to more than 25 cents of every dollar of national income is plainly indicated.

Both inherent and acquired is the tendency of taxes to increase faster than income and population. In the 40 years between 1890 and 1930 national income went from 12 billions to 71 billions. Government expenditures, Federal, State and local, in the same 40 years, increased from 855 millions to 13¼ billions, or by 1500 per cent.

For each inhabitant the cost of government which in 1890 was \$13.60 had swelled to \$107 by 1930. It is now estimated for 1932 at \$31 for Federal

and \$85 for State and local expenditures—a total of \$116 per capita.

Double Population, Sixteen Times Government Cost

Between 1890 (when it was 63,000,000) and 1930 our population practically doubled.

In the same time, with a development of material wealth never paralleled, national income increased six times—from 12 billions to 71 billions.

In the same 40 years Government expenditures increased 16 times (855 millions to 13,250 millions)—eight times the rate of population increase and two and two-thirds times the rate of increase in national income.

Local Levies Grow With Federal Deficits

Federal tax burdens have been made spectacular of late by the bonus (Concluded on Advertising Page 20)

Definite Progress in Alloy Steel Despite The Depression

By EDWIN F. CONE
The Iron Age, New York

AN analysis of statistical data of the American production of alloy steels reveals the rather interesting fact that, despite the depression, real progress has been made in the output and consumption of such steels.

In THE IRON AGE of Aug. 29, 1929, under the title "Twenty Years of Alloy Steels," the progress of the industry was analyzed through 1928, or from 1909 to 1928 inclusive. It is the aim of this article to briefly bring up to date this analysis, which includes the years 1929, 1930 and 1931 as shown by the official data of the American Iron and Steel Institute, and to show the effects of the business depression. Thus the whole period embraced by the data is 23 years.

Peak in Output in 1929

The peak in the development of the American alloy industry was reached in 1929 when nearly 4,000,000 tons was produced. In that year the alloy steel output reached 7 per cent of the total steel ingots and castings, the largest on record, as shown by Table I. Also in that year the ratio of tons of total steel to one ton of alloy steel fell to the lowest recorded, or 14.2 tons, also shown in Table I.

Table I—Production of Alloy Steel Ingots and Castings in the United States

	Total Alloy Steel, Gross Tons	Total Steel, Gross Tons	Alloy Steel of the Total, Per Cent	Tons of Total Steel to 1 Ton of Alloy Steel
1909.....	181,980	23,955,021	0.75	131.6
1910.....	567,819	26,094,919	2.17	45.9
1911.....	481,459	23,676,106	2.03	49.1
1912.....	792,501	31,251,303	2.53	39.4
1913.....	714,357	31,300,874	2.28	43.8
1914.....	646,953	23,513,030	2.75	36.3
1915.....	1,021,147	32,151,036	3.17	31.4
1916.....	1,362,615	42,773,680	3.18	31.3
1917.....	1,644,335	45,060,607	3.65	27.4
1918.....	1,787,852	44,462,432	4.02	24.8
1919.....	1,481,188	34,671,232	4.27	23.4
1920.....	1,660,292	42,132,934	3.94	25.3
1921.....	809,548	19,783,797	4.10	24.3
1922.....	1,673,496	35,602,926	4.70	21.3
1923.....	2,106,489	44,943,696	4.70	21.3
1924.....	2,026,409	37,931,939	5.35	18.7
1925.....	2,432,973	45,393,524	5.36	18.6
1926.....	2,463,414	48,293,763	5.10	19.6
1927.....	2,531,748	44,935,185	5.59	17.7
1928.....	3,214,909	51,544,180	6.23	16.0
1929.....	3,957,207	56,433,473	7.01	14.2
1930.....	2,443,311	40,699,483	6.00	16.7
1931.....	1,455,913	25,945,501	5.61	17.8

While the effect of the depression has been to alter these trends adversely, the change has been small. Since 1929 the alloy steel proportion of the total steel output fell in 1931 only to 5.61 per cent which is larger than in any year previous to 1927. (See Table I.) And the ratio of tons of total steel to one ton of alloy steel rose during the depression to 17.8 tons in 1931, lower than in any year prior to 1927.

Large Demand for Alloy Castings

Increased demand for alloy steel castings has been a striking development during the depression. As shown by Table II, the percentage of alloy steel castings of the total alloy steel production rose in 1930 and 1931

Table II—Production of Alloy Steel Castings in the United States

	Total Alloy Castings, Gross Tons	Total Alloy Steel, Gross Tons	Percentage of Alloy Castings of Total
1909.....	23,002	181,980	12.64
1910.....	29,357	567,819	5.17
1911.....	56,290	481,459	11.69
1912.....	103,109	792,501	13.01
1913.....	88,927	714,357	12.44
1914.....	69,846	646,953	10.79
1915.....	97,896	1,021,147	9.58
1916.....	56,458	1,362,615	4.14
1917.....	67,529	1,644,335	4.10
1918.....	66,485	1,787,852	3.71
1919.....	45,372	1,481,188	3.06
1920.....	68,353	1,660,292	4.11
1921.....	40,255	809,548	4.97
1922.....	59,104	1,673,496	3.53
1923.....	92,220	2,106,489	4.37
1924.....	85,948	2,026,409	4.24
1925.....	112,583	2,432,973	4.63
1926.....	146,101	2,463,414	5.93
1927.....	145,844	2,531,748	5.72
1928.....	169,684	3,214,909	5.28
1929.....	192,920	3,957,207	4.87
1930.....	126,128	2,443,311	5.17
1931.....	89,903	1,455,913	6.17

above previous recent records attaining last year the high figure of 6.17. This contrasts with only 4.87 per cent in 1929 and 3.06 per cent in 1919, the low point in the 23-year period.

Another feature of the progress during the depression has been the expansion in the quantity of alloy steel made in electric furnaces. In 1929 the percentage of electric alloy steel of the total alloy steel output was 12.87. In 1931 this proportion rose to 15.94 per cent or the largest

in the history of the alloy industry with the exception of 1918, a war year, when it was 16.26 per cent. (Table III.)

Paralleling this is the expansion during the depression of the demand for alloy steel castings made by the electric process. At 20.34 per cent of the total electric alloy steel in 1930 and at 19.86 per cent in 1931, the pro-

Table III—Production of Alloy Steel Made in Electric Furnaces in the United States

	Electric Alloy Steel, Gross Tons	Total Alloy Steel, Gross Tons	Electric Alloy Steel of Total Alloy Steel, Per Cent
1909.....	.....	181,980	.....
1910.....	608	567,819	0.11
1911.....	.....	481,459	.....
1912.....	9,619	792,501	1.21
1913.....	11,264	714,357	1.57
1914.....	9,344	646,953	1.44
1915.....	27,944	1,021,147	2.73
1916.....	71,129	1,362,615	5.22
1917.....	130,578	1,644,335	7.94
1918.....	290,961	1,787,852	16.26
1919.....	181,632	1,481,188	12.26
1920.....	245,572	1,660,292	14.78
1921.....	63,246	809,548	7.81
1922.....	125,419	1,673,496	7.49
1923.....	194,976	2,106,489	9.25
1924.....	188,563	2,026,409	9.30
1925.....	293,780	2,432,973	12.00
1926.....	306,811	2,463,414	12.45
1927.....	343,517	2,531,748	13.57
1928.....	435,096	3,214,909	13.47
1929.....	510,030	3,957,207	12.87
1930.....	300,520	2,443,311	12.31
1931.....	232,113	1,455,913	15.94

portions exceed those of any year since 1926. (Table IV.)

Thus, as judged on the basis of percentages, the showing of the American alloy steel industry in the two years of the depression, following the boom records of 1929, is one of satisfactory and marked progress.

Some Tonnage Data Compared

When relative tonnage output is considered the picture has its interesting features. Taking the total steel output for 1931 at roundly 25,945,500 tons, the year which corresponds with this was the 26,094,900 tons made in 1910. But in that year of normal prosperity only 567,800 tons of alloy steel was made, as against 1,455,900 tons in 1931, a year of severe depression. In other words the 1931 alloy production was nearly

three times that of 21 years earlier, reflecting the increased demand.

That the demand for alloy steel castings has expanded relatively is again emphasized by the fact that in 1919, when the 1,481,188 tons of alloy steel was nearly the same as in 1931, the alloy steel casting total of 45,370

Table IV—Production of Alloy Steel Castings Made in Electric Furnaces in the United States

	Electric Alloy Castings, Gross Tons	Total Electric Alloy Steel, Gross Tons	Electric Alloy Castings of Total Alloy Steel, Per Cent
1909.....	.....	.....	.....
1910.....	8	608	1.32
1911.....	.....	.....	.....
1912.....	402	9,619	4.18
1913.....	443	11,264	3.93
1914.....	340	9,344	3.64
1915.....	96	27,944	0.34
1916.....	926	71,129	1.30
1917.....	1,296	130,578	0.99
1918.....	3,076	290,961	1.05
1919.....	6,057	181,632	3.33
1920.....	11,710	245,572	4.77
1921.....	10,084	63,246	15.94
1922.....	17,760	125,419	14.20
1923.....	29,054	194,976	14.90
1924.....	28,821	188,563	15.25
1925.....	44,406	293,780	15.10
1926.....	64,003	306,811	20.86
1927.....	59,157	343,517	17.22
1928.....	79,434	433,096	18.34
1929.....	94,067	510,030	18.44
1930.....	61,249	306,520	20.34
1931.....	46,986	232,113	19.86

tons was only a little more than half the 89,900 tons made in 1931.

Factors Favoring Expansion

Several factors have contributed to the good showing in alloy steel demand in the face of a business

depression. An increase in the number and types of alloy steels, whether as rolled products, forgings or castings, has made available to industrial engineers wider selection of materials to meet new and special needs. But alloy steels generally are of little value unless heat treated. Improvements in heat-treating equipment and methods, even during the depression, have been numerous, enhancing the value and usefulness of the alloy steels themselves.

Another factor tending to relatively larger volume is the growth in the quality, types and applications of the rust and corrosion-resistant steels. Much wider knowledge concerning these steels together with success in solving some of the problems which

have arisen as a result of their use in certain industrial applications, particularly where high temperatures are involved, has been favorable to their larger use.

What of the Future?

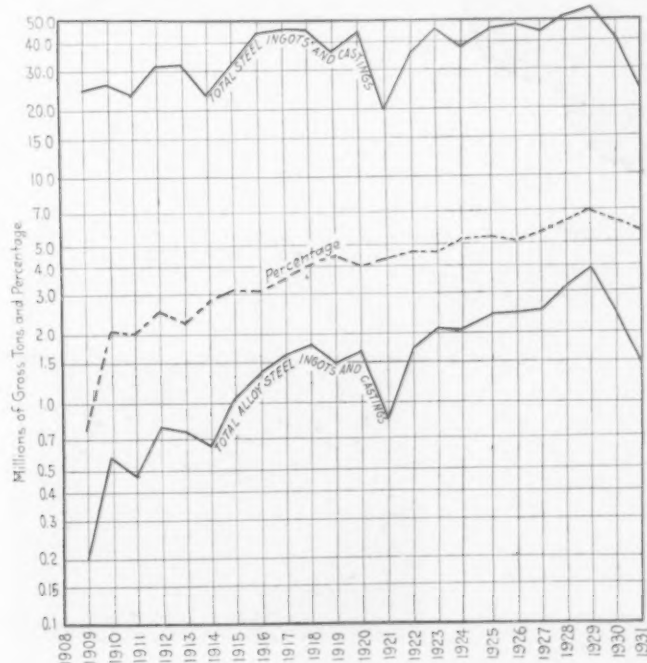
Will the record for 1932 be as favorable to alloy steels as has that of the past two years? While the showing may not be as satisfactory it will probably compare favorably with 1930 and 1931 and exceed the record during the severe depression of 1921. The onward march of alloy steels is assured. Based on the record during the depression, the development, when more normal times come, should be even more impressive than during the prosperous years of 1924 to 1929.

HIGH LIGHTS IN 23 YEARS OF ALLOY STEELS

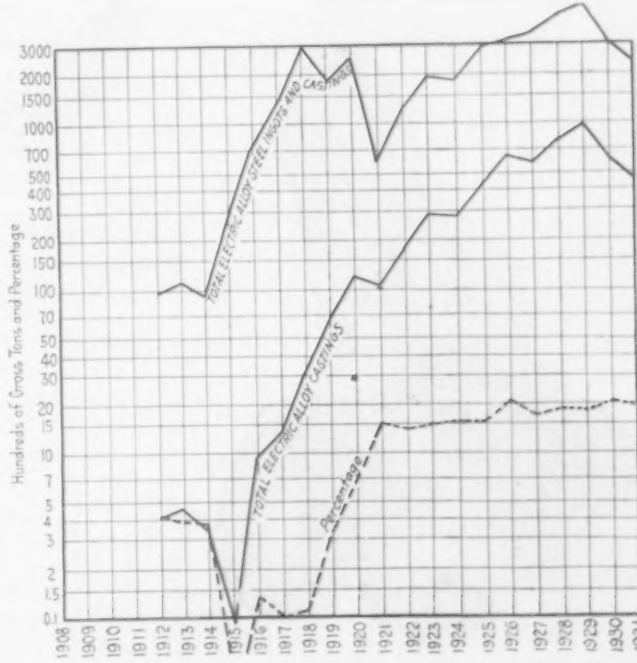
Peak in output reached in 1929 at 7 per cent of total steel production. Fell only to 5.61 per cent during the depression.

Large demand during depression for alloy steel castings—6.17 per cent of total alloy steel in 1931 or best showing in 16 years.

Electric furnace output of alloy steel reached 15.94 per cent of total alloy steel in 1931—highest but one on record. Splendid showing also for electric alloy steel castings during depression—record of last two years exceeded only once in the 23-year period.



How the proportion of alloy steel to the total steel output has fluctuated in 23 years.



Comparison of electric alloy steel castings and total alloy steel made in electric furnaces since 1912.

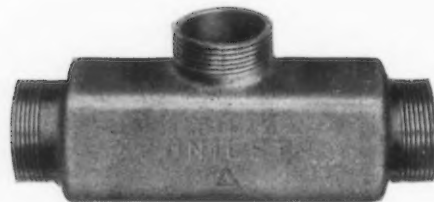
"Better Times"—

{ Second of a series of "Performance Pages" as
selected from actual practice by The Iron Age
Editors }



Automobile Jack Part

Previous method, 30 per man hr.
Present method, 130 per man hr.



Electrical Conduit Connection

Previous method, 125 per man hr.
Present method, 285 per man hr.



Shock Absorber Vane

Previous method, 60 per man hr.
Present method, 350 per man hr.



Airplane Starter Clutch

Previous method, 6 per man hr.
Present method, 32 per man hr.



Automobile Spring Hanger

Previous method, 50 per man hr.
Present method, 325 per man hr.



Transmission Brake Support

Previous method, 20 per man hr.
Present method, 50 per man hr.

PRODUCTS: Various mechanical parts, as specified

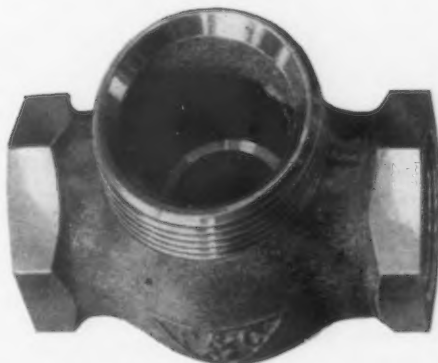
OPERATIONS: Turning, boring, facing, etc.

PRODUCTION EQUIPMENT: Goss & DeLeeuw multiple spindle chucking machines



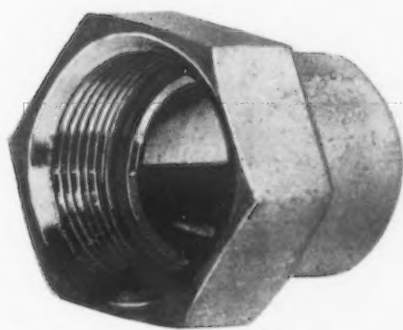
OBsolescence can only be defined in terms of results. As a guide to makers of metal products, the "Better Times" series originated by The Iron Age will aid in the comparison of results now obtained with results obtainable. Practical examples of actual production time on typical operations are given in order that plant managers may check performance on similar operations.*

*In some of the instances shown this week, one operator runs two machines. Production is therefore given in output per man hour.



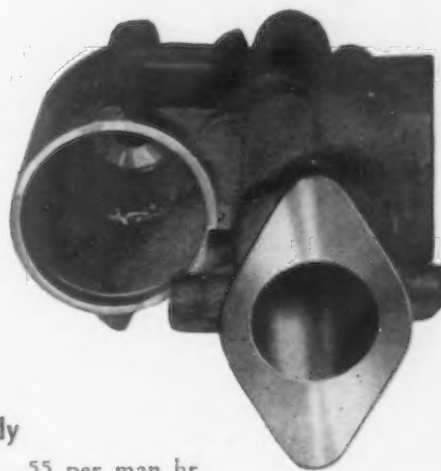
Valve Body

Previous method, 120 per man hr.
Present method, 240 per man hr.



Brass Tube Nut

Previous method, 125 per man hr.
Present method, 350 per man hr.



Carburetor Body

Previous method, 55 per man hr.
Present method, 155 per man hr.



Washing Machine Gear

Previous method, 30 per man hr.
Present method, 120 per man hr.



Automobile Bumper Plate

Previous method, 40 per man hr.
Present method, 360 per man hr.

Determining Size and Personnel for Oil-Burning Furnaces

By ROBERT C. HOPKINS

Alliance Brass & Bronze Co., Alliance, Ohio

THE art and science of furnace building are now a highly specialized branch of engineering. Great progress has been made, but much remains to be done. In this work furnace engineers have been greatly aided by the heat resisting and insulating materials which naturally follow in the wake of conditions and demand. The rapidly increasing number of special furnaces are the answer to production methods which have speeded up in other manufacturing operations and also for the closer control of metallurgical processes. To do maximum specialty work, the tools and accessories must also be in the nature of special adaptations, and the rule permits no departure.

The duties of plant engineer are so many and varied that little time is available for special application other than developing improvements for working equipment; but since nearly all engineers have some kind of hobby, it may take the form and nature of furnace design. In any event, that concern is fortunate which has an engineering staff with a leaning toward better furnaces. As a rule, the design of special furnaces should be left to the men who make it their business and who from experience have learned what not to do as well as the better applications.

For tonnage output and all around economy the continuous type of furnace takes the lead, but it is limited to the size and shape or a fair approach to the stock for which it was designed. For the general purpose furnace there must be a sacrifice of both output and cost of operation. Small orders, and variety of forgings in size and shape, bring a demand for general purpose equipment, and so the small boxlike, in and out, furnace will always have a place in the forge shop. Home talent is usually employed in building this class of furnace and many times it is the equal of the best produced by regular furnace builders. The plant engineer has the advantage of close contact, and the results of observation, trial and elimination can take the form of a practical design for overcoming objectionable features; and in this way many very

FURNACE building has now become highly specialized. And so great has been the progress that that concern is fortunate which has an engineering staff with a leaning toward better furnaces. Yet the design of special furnaces should be left to those who make it their business and have learned what not to do.

How to determine size and fuel needs of the box-like furnace common in forge shops is explained in the accompanying article, which is the last of four parts into which the author's complete contribution was divided.

Mr. Hopkins rounds out this remarkable monograph with an interesting suggestion of the play of psychology in selecting the man to be placed in charge of the equipment.

good furnaces are added to the shop equipment.

The rules and formulas for calculating furnace operation range from guesswork to the higher mathematics, and very often disclose the actual operation considerably removed from the original intention. All rules, systems and formulas must have certain known quantities, or are otherwise worthless.

There is one important thing to consider with any heating arrangement, and that is the rate that the stock will absorb heat. To expect a through and through soaking heat with an overloaded and overheated furnace is just as much of the impossible as lengthening days and years. Machines have their capacities and materials their measures of conductivity, and the overload runs to waste and defective product.

Calculating Capacity of a Furnace

There is one constant which can be relied upon, and that is the amount of heat required to raise a pound of steel to a given temperature. It is not one thing today and another tomorrow, but fixed as the law of gravitation, and it furnishes the starting place in finding the output of any furnace. One of the charts furnishes an easy method of quickly reading the number of B.t.u. or heat content of various metals at different temperatures, also indicating the melting point for each material.

According to the chart a forging temperature of 2300 deg. F. means that the pound of steel has absorbed 380 B.t.u., and if carefully measured

in cooling, would yield or exchange the same amount for the same range of temperature. Heat treating at 1750 deg. represents a heat content of 290 B.t.u. per lb. and for any temperature below melting point, the B.t.u. varies nearly directly with the temperature.

There are two ways of calculating the soaking heat capacity of a box type forging furnace. One is to allow a certain number of pounds for each square foot of hearth surface with such values as 80 to 100 lb. assigned. This method can only check with a certain ratio of sidewall to hearth area. One furnace could have twice the actual inside area of another, but with the same hearth and obviously a wide difference in capacity. Apparently the better method is to consider the hearth, roof and walls as a flame-swept surface and determine the heat exchange from that basis.

Let us consider a heating furnace just what it is, namely, an enclosure which absorbs part of the heat of combustion and also a container which will radiate a portion of the absorbed heat to the stock or material charged into it. The stock will have a fixed rate of absorption and the refractory walls have a certain radiating capacity in B.t.u. per hour. The ideal condition is a near equality, but this is unusual and can only be approximated. The following example indicates the easy steps which will work out in a practical way.

A common type of forging furnace measures 5 ft. wide, 2 ft. 6 in. deep and 2 ft. measured from hearth to a point midway between spring line and

top of arch. Adding together the hearth, roof and wall areas, the total interior surface is 55 sq. ft. Assuming an opening for charging and drawing of 6 in. high and 4 ft. long, the actual radiating surface is 53 sq. ft. Assuming a forging temperature of 2250 deg. F. and allowing 100 deg. excess, the furnace will represent a temperature of 2350 deg. F.

By consulting the heat transfer curves, using the median line, the radiating capacity is found to be 9700 B.t.u. per hour per sq. ft. Multiplying 53 by 9700 gives the total for the furnace as 514,100 B.t.u. Dividing this product by 380, the number of B.t.u. absorbed by 1 lb. of steel, shows the heating rate is 1350 lb. per hour. A bar of ordinary forging steel will absorb heat very nearly at the rate of $\frac{1}{4}$ in. of diameter in a space of 5 min. or the equivalent of 3 in. diameter per hour, and at this rate the heated structure is fairly uniform and in prime condition for forging. The next step is to apply the furnace efficiency.

Calculating the Fuel Requirements

There are various heat losses aside from combustion, among which the following are noted: Storage in walls and structure. Direct radiation through openings. Radiation from walls and structure. From stock projection. Lack of proper circulation. From expelled gases of combustion.

The above are mainly responsible for the ratio of heat input to the actual work accomplished, and this ratio stated by percentage is expressed as the furnace efficiency. Furnaces similar to the one under discussion have been observed as low as 8 per cent in efficiency and not much over

15 per cent. It may be noted that any type of furnace will yield better results when new, with joints tight and linings unvittrified, and for any calculation, the losses can only relate to actual conditions at one time.

For the purpose of this problem, let us assume a $12\frac{1}{2}$ per cent efficiency percentage. This means multiplying 514,100 by 8 ($12\frac{1}{2}$ per cent being $\frac{1}{8}$) and finding necessary the input of 4,112,800 B.t.u. to accomplish the hourly steel production of 1350 lb.

The amount of fuel can now be determined by dividing 4,112,800 by the B.t.u. value of one gallon of oil. Heavy oils have a content of 160,000 B.t.u. per gal., and the quotient of this divisor is 25.7, which is the fuel required per hour for heating 1350 lb., or at the rate of 38 gal. per ton of bars or billets.

The quantity of air is found by multiplying 25.7 by the constant 30, giving a product of 771, the number of cubic feet per minute. Two burners are used with this size of furnace, and if no allowance is made for induced air, each burner must deliver 385 cu. ft. per min. At a pressure 12 oz. the approximate air flow in 122 cu. ft. per min. per sq. in. of burner nozzle and to provide for 385 cu. ft., the burner nozzle will need an area of 3.2 sq. in., and if circular, a diameter of 2 $\frac{1}{16}$ in.

The question must naturally follow as to how much reliance can be placed

on this method of furnace and accessory calculation. The answer depends on the manner of operation. It is not a new thing to see a heater drag out a bar or billet too cold for any good forging, and again trying to force the furnace by turning on more oil than there is air to consume. Boring out the nozzle is another way of speeding up a unit beyond its fair working capacity. When operated with proper knowledge and skill, this method is a good approximation and with only one assumed quantity, namely, the furnace efficiency.

Burner Ports Call for Specific Attention

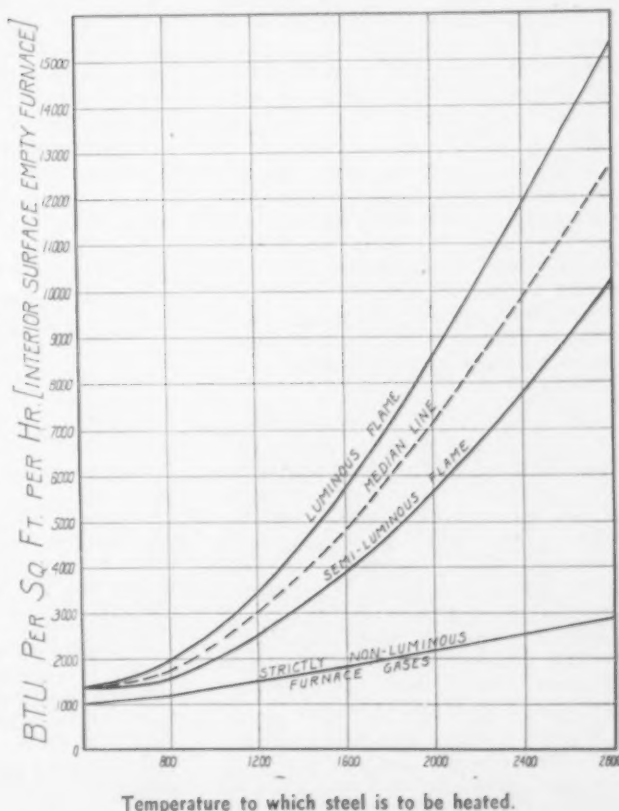
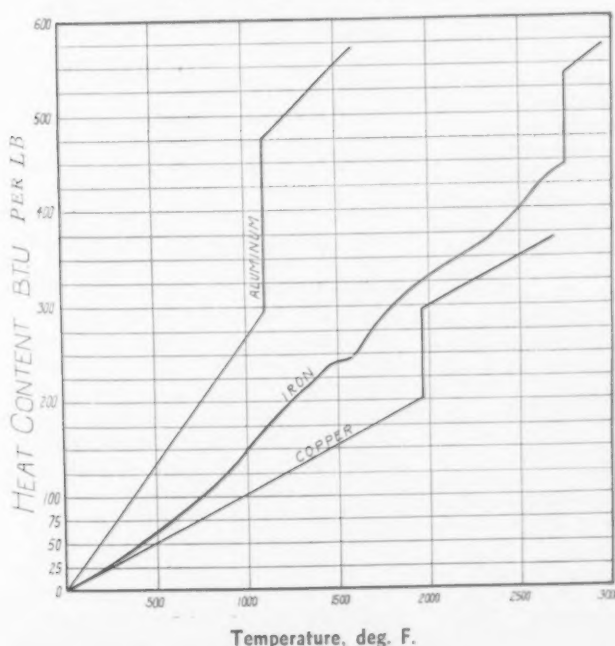
Burner ports are often neglected in design, and more often in the building. Either too small or too large, and with insufficient clearance to prevent the impingement and wash of oil from the burner. Oil burners have been condemned when the cause was found in the shape and size of the port. Common sense is surely not in common use when related to burner ports.

To begin with, the oil burner manufacturer will be glad to furnish sketches and detail drawings, then make or build a port and give it a trial. Observe the burner in operation, and if there is not enough clearance to prevent oil wash, increase the angle or flare to where the flow of air



GIVEN the required furnace temperature, this chart will show how much heat, (in British thermal units per square foot per hour), will be given up from each square foot of the inside surfaces of the furnace. Multiplying the combined interior areas of hearth, roof and walls by this factor gives the total heat available for treating the material to be placed in the furnace.

IF a pound of any of the three metals named in the chart is heated or cooled through the range of temperature indicated, the figures at the left will give the amount of heat absorbed or released, as the case may be. The chart is a convenience in calculating heat requirements in designing a furnace.



and oil is in no way obstructed or contracted. After seeing many otherwise good furnaces in operation, these bungled and carelessly built details are a crime against intelligence. Among the many examples are rough square holes run straight through the furnace wall, confining and restricting instead of permitting the air and oil to expand and form into a natural flow form.

The correct size and shape of a burner port will act as a recuperator and a saving of fuel will result. Under a variety of conditions, the author has used a flare of 45 deg. in shaping the port, that is, 22½ deg. measured each way from the center line or burner axis. After preliminary trials, the way is then open for the maker of refractory shapes and the question of burner ports is settled.

Control and Metering

Automatic control has saved many a dollar in cost and at the same time improved the product. A battery of furnaces wired up for temperature readings without automatic control will soon indicate a positive value, with a central reading station set up in a convenient place away from the furnace room. The effect on the furnace operation is obvious.

There is hardly a furnace which cannot be equipped to advantage either for automatic control or temperature record. In this special line there are a number of good, reliable firms with plenty of important information on every phase of this important subject.

Flow meters installed in by-passes are of considerable advantage at various points of the system. Where possible, the furnaces may be grouped and classified and in this way the more expensive operations can be checked. One design or class of furnace can be very wasteful when compared with available equipment of another design.

The difficulty of measuring an oil flow has led many engineers and plant managers to question the value of any type of meter, but when considering the delicacy of operation with the nature of fuel oil with its content of sludge, free carbon, mineral grit, and varying viscosities, it is not so much the mechanism as the material to be metered.

The best cure for meter trouble is the mechanical treatment of the fuel and a constant temperature and under these conditions meters can be made to function and with satisfactory results. Considerable money has been spent in efforts to produce a flow meter for all conditions of untreated fuel, but it is not in the nature of things to maintain close clearances and at the same time pass coarser particles through them, and therefore the meter man is not to blame.

A good thermometer in the oil line will eliminate all the guesswork in maintaining the right oil temperature. Relatively inexpensive, there is

neither reason nor excuse for not adding this instrument to the general equipment. In case of a long circulating line, there should be at least two thermometers, one at the heater and another at or near the last furnace.

The oil supply line should have a stop or shut-off valve near each burner to facilitate cleaning, repair or replacement of the regulating valve. In this way the other burners are kept in operation instead of shutting down the furnace altogether. An ordinary stop-cock or any other dependable valve will answer, since it is not used except at intervals. A valve or blast gate arrangement for main air line will also be found convenient and economical, especially when the plant is below normal production.

Selection of the Operator

We now come to the most variable and intricate of all the factors in mechanical and metallurgical processes—the operator. Much depends on the man for the success or failure in reaching the objective. As in the practice of law or medicine, a certain number become expert, the remainder scale down to inefficiency and failure, and this is true of men who undertake the important work of burning oil. If after a reasonable time, no aptness or progress is observed, it were better to find other employment for the beginner and try another. The all-important subject of heating demands as much attention as selecting a press or hammerman.

Plants are usually run by the dominating intelligence of one man. Sometimes he is located in the main office and at others in the factory. However the argument, the more masterful personality prevails, and affairs are shaped accordingly. There should be enough difference in these powers of personality to make leadership apparent, otherwise a conflict is almost sure which may take form under the slightest pretext.

In recent years a great many theories have been put in the discard while a few have been turned to practical account. We have tried everything from physical encounters to the Golden Rule, but in the meantime human nature has not changed one iota. A very successful shop manager was once asked for the rule he used in maintaining harmony. "I don't hire men I can't lick," was the answer, and it illustrates the point. Whether by physical means, skill, knowledge or enterprise, the difference represents the dominant energy, and when new methods are undertaken, it is the actual boss who furnishes the aid and cooperation.

In the make-up of men, a certain amount of prejudice appears as an ingredient to take the place of deficient knowledge, skill and experience, and every executive soon learns this characteristic of the men who assist in the factory operations. With respect to their reactions, there are

two groups. The individual of one group reacts to a new thing or suggestion by seeing everything in its favor and will even overlook defects and incompleteness in the urge to carry out. This is the man to undertake new ventures, but only after his being well informed as possible and guided on through the development.

The other type reacts to an idea or suggestion by an immediate general attack, to show the lack of value and impossibility of improvement, and will go to great length in reinforcing his opinion, and where the strong prejudice rules, there will be an actual hindrance set up, often under cover of the utmost caution and secrecy. These men are generally truthful and trustworthy otherwise. They simply react differently and cannot endure parting with settled views, old methods and traditions. These conservative individuals, like any other, are valuable only for what they can bring to bear, and their fault finding can be capitalized in the search for defective and questionable features.

Submit the problem first to the man of favorable reaction, and when fairly developed, call in the adverse critic. After the acid test of criticism, the plan of operation can be remedied or reinforced and put in readiness for trial. Commit the development work to the man who is eager and enthusiastic for its success and then stand back of him to the last ditch; the conservative will easily fall in line and possibly lend active support when success can no longer be denied, later to assume a fair share or all of the credit for the outcome.

Time and again the author has noted these interesting psychological phases in dealing with the subject of better heating and the methods of doing it. At first, the thing cannot be done, later it may be a possibility, and in the end it was done, and all because of finally getting enough interest and enthusiasm in motion to dominate and later to mass the cooperative energy.

The executive who lacks the courage to face a situation or who fears his subordinates can only fall back on subterfuge and stratagem, and is therefore hindered in direct approach and prompt action. Learning the facts, judging actual values, and then meeting the situation with a head-on collision is a method which has put more progress into the world than all other systems put together.

In concluding this paper, the author desires to acknowledge the work of Prof. W. Trinks, department of mechanical engineering, Carnegie Institute of Technology, Pittsburgh, for charts and other data of reference, and with this acknowledgment there is a deep sense of gratitude. Prof. Trinks, by his genius and versatility, has wonderfully enriched the literature of steel production and fabrication, both in the nature of technical research and practical application.

Putting the Question Mark to Work

Heat Treated Bars From Stock

Is it possible to secure from stock alloy steel bars which are heat treated to definite and assured physical properties? We do not have enough requirement for heat treated material to warrant cost of heat treating equipment. From time to time, however, jobs develop in which dependable material must be used.

C. A. S.

SEVERAL good grades are available. One, with the trade name Ryco, is hot rolled, heat treated, machine straightened steel intended for general production work. It is often used where a steel stronger than either mild steel or cold rolled shafting is desired, and where the cost must be less than chrome nickel or 3½ per cent nickel steel.

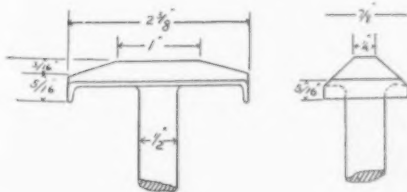
Another heat treated steel has the name Nikrome. This is a standard grade used for automobile axles, drive shafts and for special bolts and other parts subjected to heavy stress. It has a tensile strength of more than 125,000 lb. per square inch, and a minimum yield of 105,000 lb. per square inch.

K. J. E.

Methods of Forging

We have obtained a large order for bolts as shown in the sketch, and want to reduce production cost to a minimum. Can you help us in solving this problem?

General Forge Products, Ltd.
Shanghai, China.



A COMBINATION of three upsetting or gathering operations on a ½ in. bar should produce a blank of sufficient size to permit completing this bolt by hot sawing and forging. Various manufacturers make a hot sawing machine on which the blank could be sawed endwise to the desired depth, thus forming two arms, which the next operation would spread out into a rough head of the bolt. The final operation would be that of finish forming the head and bending down the lifts at the two ends.

C. G. Williams,
Consulting Engineer,
Rockford, Illinois.

COMPETITION AHEAD

THE keen competition of today is not apt to diminish with an increase in industrial activity, and the manufacturer who has introduced short cuts and economies in his production sequence will have the best chance at the new business. This page is offered as a clearing house for ideas in the hope that short cuts developed in one line of manufacturing may help develop a similar saving in other lines. Your comments and the account of some of your own short cuts are invited. Please address Forum Editor, The Iron Age Publishing Co., 239 West 39th St., New York.

Defining Nitralloy

I have found that the term nitralloy is often used rather loosely and appears to cover a considerable variety of steel alloys. Can you tell me what actually is meant by a nitralloy?

S. R. L.

NITRALLOY is a trade name covering certain steels which are particularly adaptable to surface hardening by the action of ammonia gas at an elevated temperature. The term was originally applied to aluminum-chromium-molybdenum steel, which was the first nitriding steel developed, and which is the one most widely used at present for nitriding purposes. Recently other alloys have been developed; one of the latest employs chromium and vanadium to accomplish the desired results. With nitriding steels of this variety it is possible to develop an extremely hard case which at the same time is tough and more ductile than is the case with some other steels.

L. A. P.

Grease Removers

I have been cleaning forgings before pickling them and have been told this is unnecessary. The parts have been broached and have some oil and grease on them. Can you advise me?

H. I. W.

GENERALLY speaking, pickling solutions are not grease removers, and therefore we advise your using a good alkaline cleaning solution before you pickle your forgings. The selection of the proper cleaning solution will depend to some extent on the nature of the oils and greases used in fabrication. The more common solutions in good practice today are solutions of soda ash, caustic soda, tri sodium phosphate and metasilicate of soda.

O. L. T.

Special Sheets for Painting

We have had difficulty trying to paint new galvanized sheets. Is there a special type of sheet or a special paint which we could use?

G. G.

OUR research department recently made the following recommendations.

- The best procedure to be followed when galvanized sheets are to be painted is to secure some of the special galvanized sheets now being supplied, which are already prepared to accept paint and hold it tenaciously.
- Where this is not possible, natural weather is the next best thing.
- Where specially prepared sheets are not available and where time will not permit of natural weathering, then an artificial etching with copper sulphate, and certain other well-known solutions can be used, provided the surface is washed clean with clear water prior to painting. However, this represents an additional expense and sometimes the acids etch too deeply into the protective zinc coating.

American Rolling Mill Co.

Brazing Malleable Iron

We have had difficulty welding malleable iron to rolled steel products. Is this being successfully done by others?

C. W. W.

WE are successfully brazing malleable iron to seamless steel tubing. The tubes are first pickled in a dilute solution of muriatic acid to remove any scale. The ends of the tubes are then coated with a flux composed of borax and light machine oil, mixed to the consistency of molasses. After this, the tubes and fittings are assembled and tacked in place by an electric spot welder. The assembly is then placed in a bed of coke with a blow torch in place above it, and the joint to be brazed is heated to about 1900 deg., Fahr. At this temperature the brazing metal is applied and allowed to flow freely into and around the joint. The parts are then removed from the coke and allowed to cool slowly. When cool the joint is sand blasted to remove scale and loose particles, and any surplus metal is chipped or filed off to give a smooth finish.

Indian Motorcycle Co.,
Springfield, Mass.

Surface Decarburization Of Malleable Iron

By JOHN H. HRUSKA
Metallurgical Engineer, Berwyn, Ill.

MUCH has been accomplished in recent years in developing various phases of the malleable industry, and the results have been reflected not only in an increased quality of product but also in a steady growth in demand and in production. But, in spite of generally well comprehended principles, there are still certain thoughts of historical origin which frequently predominate in the minds of many otherwise quite progressive foundrymen and engineers.

While the problem of proper malleableizing has been clarified only in the last decade, the resulting physical properties are comparatively well known and appreciated by the whole engineering profession. All the progress made in the economical production of satisfactory malleable iron seemingly did not prevent a great number of executives from continuously stressing an imaginary non-homogeneity of malleable castings, the conception being that any casting made by the black heart process consists principally of a decarburized surface layer and something like a core of graphitized ferrous matter.

Perhaps the retrospective influences of the metallography of white heart malleable iron may account for the general belief that the surface of any malleable casting must necessarily be strongly decarburized. While this report shall be free of all historical facts pertaining to the characteristics of black heart malleable, modern castings made in accordance with best practice do not show any more decarburization than castings made of steel, gray iron or any ferrous alloys.

In order to prove this contention, the writer conducted a series of metallographical investigations with a view to obtaining an unbiased opinion of the prevailing status of decarburization in commercial malleable castings. While it would be outside the scope of this article to deal with the exact technicalities of the procedures applied during this work, the results of this endeavor should be interesting not only to the malleable industry, but to

BECAUSE there has been some question as to the homogeneity of malleable castings made by the black heart process and there is little experimental proof one way or the other, the author undertook an investigation. His results, presented in this article, indicate that malleable castings are by no means inferior in this respect to any other casting or heat-treated ferrous material if made by judiciously managed processes.

the consumer of this type of castings as well.

The problem has been divided into several distinctly separable phases, viz.:

1. Chemistry of decarburization.
2. Influence of decarburization upon physical properties.
3. Hardness investigations.
4. Microscopic examinations.
5. Manufacturing technique.
6. Conclusions.

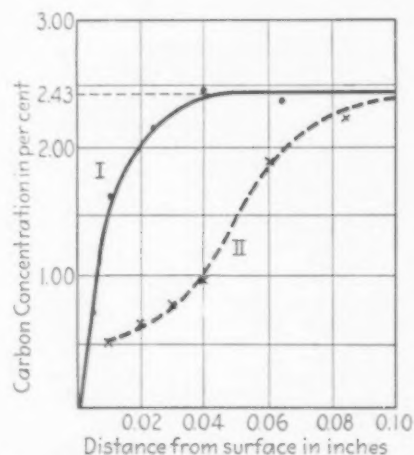


Fig. 1—Decarburization curves of black heart malleable iron containing 2.43 per cent total carbon: Curve I—Malleable iron of present manufacture. Curve II—Malleable iron made in 1921 (Schwartz).

The following paragraphs present a brief summary of the individual findings pertaining to this grouping of the investigation.

Chemistry of Decarburization

While the chemical reactions causing decarburization are seemingly simple, the resulting concentrations of carbon in the various layers decrease—judging from all cases under observation—toward the surface of the casting according to a certain mathematical relationship. To determine the characteristics of decarbonization as to its mathematical significance, a number of chemical determinations of carbon content were conducted in various equidistant layers of castings, made and malleableized under ordinary commercial conditions. The individual values obtained from these painstaking analyses were computed in diagrammatic form and later expressed in the form of equations.

That there exists a distinctly discernible relationship between the ultimate carbon concentrations in the equidistant layers adjoining the surface of malleable castings was first shown by H. A. Schwartz in 1921. Curve II in Fig. 1 presented before the foundrymen's association shows this connection graphically. The radical improvement made since in the manufacture of malleable may best be estimated by comparing this curve with Curve I obtained on a modern casting. While intentionally a specimen with about the same average carbon content has been selected for this comparison by the author, the depths of the decarburized surface layers differ by more than 100 per cent, the contemporary casting being unquestionably the more favorable one.

Referring to the above example by Schwartz, it was not stated in the original paper what type of furnace and process had been utilized in the production of the specimen. The recently made casting was produced from air-furnace iron and was malleableized in a gas-fired Dressler tunnel kiln, with a total duration of the heating and

cooling cycle of 92.5 hr., 1715 deg. F. maximum soaking temperature, no packing materials having been used for the thermal process.

From this example, it is obvious, that a decarburized depth of a few thousandths of an inch cannot be responsible for very pronounced differences of composition and consequent variations of physical properties of modern malleable castings or parts thereof.

Influence of Decarburization on Physical Properties

Following the principle of the original experiments made by the Malleable Iron Research Institute, the author made similar tests on bars produced by a few leading foundries and malleableized in accordance with what is now considered the best shop practice. As a whole, the values obtained for the tensile strength, yield point, elongation and hardness were unusually uniform. Test specimens of about 0.505 in. in diameter and 2 in. in measured length were turned from malleableized bars of 2.00, 1.50, 1.00, 0.75 and 0.625 in. in diameter. All bars revealed technically identical properties. The slight decrease in tensile strength of

ducted with metal made in 30-ton air furnaces and malleableized in a gas-fired Dressler tunnel kiln is presented in Table I.

The thickness of the decarburized surface of the original test specimens, before the machining down to 0.505 diameter, has been determined on slugs (cut off the bars as cast), by means of microscopic measurements. The depth varied from 0.006 to 0.018 in.

Hardness Investigations

Assuming that chemical and structural changes occurred on the surface of various malleable castings, an attempt has been made to detect these changes by means of judiciously conducted hardness tests. Investigating all practical possibilities by means of the known and utilized procedures of hardness testing, the more common methods were first tried. However, Brinell and scleroscope tests did not show any noticeable differences in the hardness numerals obtained on the surface and the interior of various castings. Rockwell tests by means of 0.0625-in. steel balls and at 60-kg. pressure revealed only very minute variations in the hardness numerals.

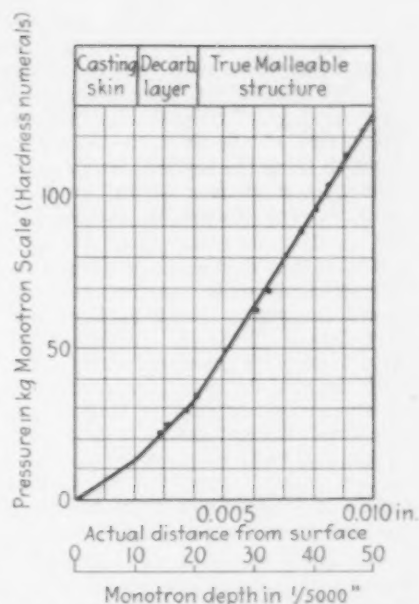


Fig. 2—Monotron hardness determinations of the decarburized surface layer of black heart malleable iron.

surface layers was established, namely, the "skin" of the casting and a thin decarburized envelope of the regular ferrite-graphite structure of the malleable casting. The thickness of both layers was repeatedly estimated from the Monotron hardness measurements and checked by microscopic examinations of the identical specimens. A comparison of some of these determinations is given in Table II.

As to the Monotron tests, the thickness of the above mentioned layers has been obtained by the coordination of so-called depths of penetration, produced by the diamond sphere of the apparatus, at progressively increasing pressures. In Fig. 2 one of the series of similar determination of hardness numerals according to the Monotron method is reproduced in diagrammatic form.

Microscopic Examinations

Besides accurate chemical determinations, microscopic research has seemed to yield the most promising criteria for an intelligent clarification of the problem. While original attempts to draw conclusions from unmounted sections of the castings under examination failed without exception

Diameter of Bar, In.		Physical Properties			Remarks
As Cast	After Turning to Test Bar	Tensile Str., Lb. per Sq. In.	Yield Pt., Lb. per Sq. In.	Elong., Per Cent	
0.623	0.503	56,100	37,320	20.8	Average Analysis: 2.29% T. C. 2.26% G. C. 0.96% Si 0.29% Mn 0.118% P 0.041% S Trace Al
0.758	0.506	55,630	36,850	21.0	
1.016	0.505	55,710	36,050	20.0	
1.490	0.504	53,070	35,880	20.2	
2.021	0.505	52,100	35,410	18.8	

bars of heavy sections, i.e., 1.50 and 2.00 in., originates in the well known effects summarized as "mass effects," a phenomenon typical of all ferrous matter. One of the series of tests con-

So far, the most satisfactory results were derived from the use of the rather new Monotron hardness tester. When scrutinizing the values thus determined, a distinct existence of two

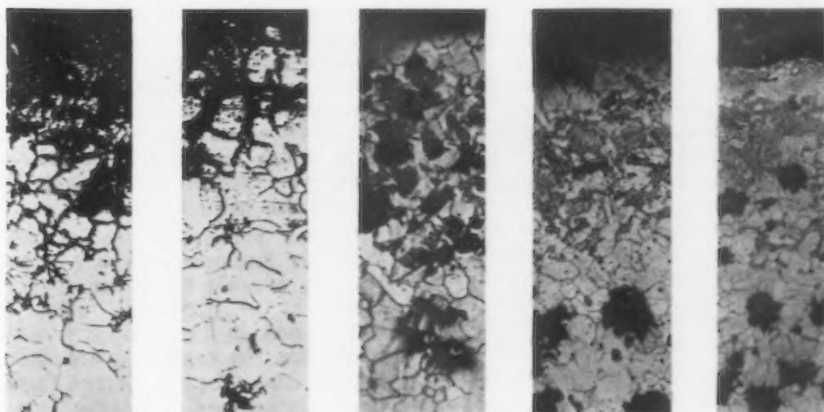


Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Microstructures of malleable castings produced under varying conditions:

- Fig. 3: Surface of casting malleableized in old type oven
- Fig. 4: Surface of casting malleableized in newer oven
- Fig. 5: Surface of casting malleableized in oil-fired oven
- Fig. 6: Surface of casting malleableized in gas-fired oven
- Fig. 7: Surface of casting malleableized in Dressler tunnel kiln

Note the different depths of decarburization produced by the various malleableizing furnaces.

TABLE II.—COMPARISON OF HARDNESS TESTS

Depth of Casting skin (mostly ferrite structure)	Average Thickness (in Inches) Determined by	
	Monotron Hardness Tester	Microscopic Measurement
Adjacent decarburized layer (ferrite plus pearlite)	0.00182	0.00187
Total decarburized surface	0.00278	0.00251
	0.00460	0.00438

(Castings used for above measurements were malleableized in a Dressler tunnel kiln.)

as to true reliability of the observed characteristics, the photomicrographs taken of mounted specimens representing the surface of various castings gave perhaps the least distorted reproduction of the existing conditions. Judging from the facts at hand, a certain type of surface seemed to characterize each process of malleablizing.

Thus, for instance, castings annealed in old oven-type furnaces disclosed frequently badly oxidized surface layers (Fig. 3), whereas white iron treated in modern tunnel kilns with careful temperature control or in other modern types of malleablizing ovens did not reveal a decarburization deeper than a few thousandths of an inch. Examples of surface layers of malleable castings are given in photomicrographs, Figs. 3 to 7.

All microscopic examinations pertaining to this subject proved conclusively that the production of high-quality malleable with uniform physical and metallographical properties throughout a section of a casting is obviously based on closest temperature control and on a preferably neutral or reducing furnace atmosphere.

Manufacturing Technique

All malleable foundrymen and metallurgists agree that a great diversity of opinion persists in the malleable industry as regards the packing or non-packing of hard iron castings for malleablizing, since the direct contact of the hard iron casting either with air, gases or solid materials during the malleablizing process must necessarily reflect itself in the metallographical appearance of the surface of the malleablized casting. Comparative investigations showed some interesting results for the various methods in use for the commercial malleablizing processes. Specimens taken from castings made a few decades ago showed invariably a strongly decarburized surface. This, naturally, coincides with the crude temperature conditions of the early days of malleable production. Later, when the use of gaseous fuels was being developed, many of the previous difficulties were overcome.

In our present rigid temperature control and precision in the production of malleable, the problem of decarburization is practically synonymous with a definite amount of negligence or incompetence. Thus, for example, the temperature of a modern tunnel furnace or kiln is checked hourly at least at 30 to 40 locations, while the prevailing furnace atmosphere is ascertained by frequent analyses of the composition of furnace gases. This explains why in most of the contemporary malleable foundries, decarburization may be kept down with the same success as in all other groups of the ferrous foundry industry. With this in mind, those types of equipment which warrant the most uniform and thoroughly controllable temperature conditions, as well as a chemically

non-reactive atmosphere, are the ones most desirable in any establishment producing high-grade malleable castings.

Conclusions

Considerable effort has been made in the last few decades to question the homogeneity of malleable castings made by the so-called black heart process. Some foundrymen improved their plant routine and finally disputed the necessity of malleable castings being decarburized to a mechanically noticeable extent.

While this moot question brought about some interesting discussions among foundrymen and other engineers, really very little experimental proof has ever been presented to the technical press or to the engineering bodies to show the correctness of the

various contentions. Therefore, a rather extensive investigation seemed to be of value to all those interested in the manufacture or the utilization of malleable castings.

In summing up, it is clear that the surfaces of malleable castings are by no means inferior to any other casting or heat-treated piece of ferrous matter if made by judiciously managed processes. Mechanical tests, chemical analyses, microscopic examinations, as well as many other means of ascertaining metallurgical homogeneity of properly made and treated malleable, prove conclusively that such castings may be and, in general, are being produced in accordance with the most rigid expectations pertaining to the uniformity of the interior and the intermediate surface layers of the casting.

Salt Baths Have Not Kept Pace With Other Heat-Treating Methods

By SAM TOUR

Vice-President, Lucius Pitkin, Inc.
New York

ONE might say that the period of depression has been more severe on the industrial use of salt baths for heat treating than on industry in general. Extension of the use of salt baths has not continued during the past five years at a rate comparable with the preceding five years. Increased tonnage could not have been expected, of course, during the depression period, but the salt bath method of heat treating has not kept pace with other methods of heat treating during the same period.

What is the cause of this condition? Some years ago the writer stated that the development of the industrial application of salt baths for heat treating was being harmed by the over-enthusiastic salesmen advocating salt baths for any and every type of heat treatment in any and every type of furnace. Rather intense competition in the selling of salt bath mixtures, combined with the price cutting activities in this field, has tended still further toward the condition of "buyer beware," thereby discouraging the extension of the use of salt baths.

Electrically Heated Salt Baths

The dark side of the picture, as indicated above, is somewhat brightened, however, in connection with the development in the electrically heated salt bath furnace field. The heating of a salt bath by passing current di-

rectly through the bath was developed more than a generation ago in Europe, but certain difficulties were encountered, due to the fact that the steel when inserted in the bath had a very much lower resistance to current than the bath mixture itself and, therefore, there was a concentration of current through the material being heated, resulting in a considerable amount of local heating.

Competition from Electric Furnaces

The development in Europe recently of the "Hultgren" type of salt bath furnace in which two opposing electrodes are placed near each other in the corners of the bath, so that the current does not travel through the work which is being immersed, has opened up certain new fields in this type of salt bath furnace.

It was particularly to be hoped that this development would increase the use of salt baths for the heat treatment of high-speed steel, but competition in this field has developed from the controlled atmosphere type of Globar heated electric furnace as developed by C. I. Hayes, Inc., of Providence, R. I. In this controlled atmosphere type of furnace, it has been found possible to practically completely eliminate scaling, blistering, decarburization, burning of points, etc., in the heat treatment of the regular 18-4-1 type of high-speed steel.

Trends in Alloy Steel Metallurgy

STEEL making is now passing through one of the most interesting phases of its long development. The past year has seen all steel products, and particularly those commanding some premium in price, subjected to the most critical scrutiny and analysis. Industry is asking, "Is their cost justified? Can some other steel do the job just as well?"

Despite this general attitude on the part of steel users, new steels have been introduced in the general alloy field during this period, but in our opinion the most important advances have been made along the lines of finer quality of existing analyses, with consequent closer control of grain characteristics and of cleanliness.

The significance of this trend is likely to be overlooked because there is nothing of the sensational about it. It means, however, that we are producing steels in the open-hearth today of a quality comparable to the high-grade electric furnace steels of a decade ago, while the steels now produced in our electric furnaces are of a quality that would have been considered impossible of commercial attainment during the early nineteen-twenties.

This has come about partly through persistent research in the steel mill toward improved product and performance and partly through industry's insistent demand that all variable factors which might interfere with split-second production schedules be eliminated at the source.

The steel maker today stands closer to the customer's production line than ever before. No longer do steel users keep a two months supply of raw material on hand. This universal tendency toward buying only for immediate needs has tremendously complicated the steel-maker's problem. He has the dual task of supplying steels with maximum uniformity and exceedingly close physical characteristics in relatively limited quantities and at a moment's notice. That he has performed this service successfully is attested by the higher performance standards of today's airplanes and automobiles.

Perhaps the outstanding specific development during the past year has been the increased use of $3\frac{1}{2}$ per cent nickel steel, with molybdenum. Introduced a few years ago by the Central Alloy division of Republic for the automotive industry, its use is expanding rapidly and its performance is reflecting credit upon its originators and those who employ it.

It is evident that the alloy development, originally moving along rather restricted lines, is broadening, and a

By M. J. R. MORRIS
Chief Metallurgical Engineer,
Central Alloy Division,
Republic Steel Corp.,
Massillon, Ohio

return of business volume will make this trend more apparent. Originally the art was confined to the standard carbon steels alloyed with vanadium, chromium, nickel, molybdenum, etc., wherein alloys served to increase physical properties such as strength, toughness, hardness and fatigue resistance. This phase developed far beyond most expectations and is still the backbone of the alloy industry.

Broad Market for Rustless Steels

The newer phase, now well beyond the experimental stage, has opened broad new markets for the steel industry. It is the tremendous field of corrosion-resisting steels, broadly classified as "stainless." Through the very depths of the depression the rustless steels have made progress. Their use in architectural applications has expanded in the face of a great decline in general building.

In food processing industries the trend toward rustless steel has been little short of sensational. In packing plant equipment, dairy machinery, canning plants, candy machinery and others, an overwhelming percentage of all new equipment bought during the past year has had rustless steel in

parts subject to attack from the materials handled. The food service industry, represented by countless restaurants and hotels, has also been quick to learn the advantages of a metal that does not stain or tarnish.

Certain of the rustless steels have the highly important property of resisting very high temperatures without scaling and with strength well maintained at such temperatures. This presages a complete revision of our present methods of steam generation and many observers believe that the heat-resisting applications will represent the largest field of development for the rustless metals. Stainless refractories are an actuality and have many advantages in certain applications. Thus the building industry, the food industry, the chemical industry—never considered before as markets for the alloy steel maker—suddenly present themselves as new worlds to explore and conquer.

Our conception of the steel industry has changed materially in the recent past and is still changing. Once considered in terms of simple steels whose only measuring stick was tonnage, we now have products becoming more and more flexible to meet the varied and severe requirements of our complex industrial civilization. It seems entirely reasonable to believe that many other industries now relatively independent of the steel industry will shortly find themselves within the legitimate province of the alloy steel maker in his ambitious quest for new and larger markets.

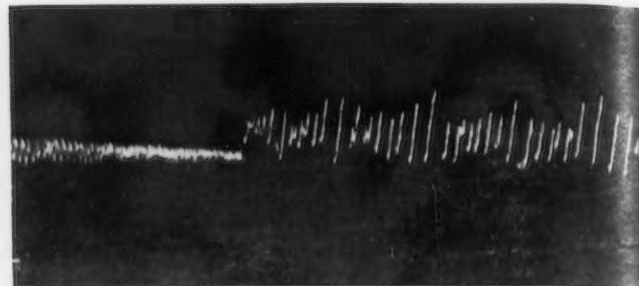
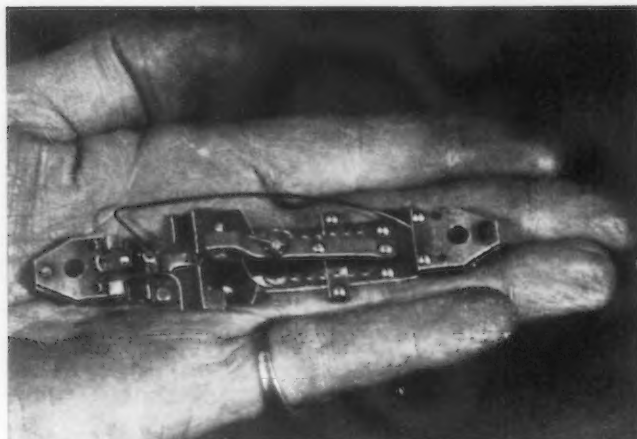
High-Test Iron and Steel for Gears

By L. A. DANSE
Chief Metallurgist, Cadillac
Motor Car Co., Detroit

A year ago high-test cast iron was produced with considerable difficulty but the mystery surrounding its manufacture has been dissipated and today its output is rather general practice. The development of the technique was the major problem to be solved as the chemistry and metallurgy did not offer unusual obstacles. High-test cast iron is being substituted for malleable castings in structural parts to some extent in addition to its original use for wearing parts such as brake drums and clutch plates.

Improved methods of heat treatment and improvement in the steel itself have made possible the manufacture of gears having higher surface hardness to resist wear and high-

er tooth strength to resist stresses of service. Whereas it formerly was general practice to heat treat high-grade gear steel so as to get a fatigue life of 150,000 to 300,000 cycles, we now get 450,000 to 800,000 cycles with the same steel. By slightly modifying the composition of the steel we get 1,250,000 to 1,750,000 cycles. These figures apply to complete failure or tooth breakage and should be supplemented by figures giving the life to the point where pitting or excessive wear takes place. These are 100,000 to 175,000 cycles for the method formerly used compared with 550,000 to 950,000 cycles for the improved steel and the new process of heat treatment.



THE small size and light weight facilitates measuring dynamic stresses in light-weight structures. Several of these "scratch" extensometers may be applied to a given structure for simultaneous determination of stresses.

❖ ❖ ❖

A specimen of the record made by the diamond member of the extensometer is shown in the part of a steel target reproduced above.

Small Extensometer for Use on Both Light and Heavy Structures

THE "scratch" extensometer recently announced by the Southwark division of the Baldwin-Southwark Corp., Philadelphia, is designed to record tension-compression strains, and also shear strain when tension-compression strains are present. A special adaptation of the instrument permits recording pure shear strain alone.

The instrument is only 4 in. long and weighs less than an ounce. It may be attached to light as well as heavy structures, and several of them may be applied to a given structure for simultaneous determination of stresses. The small size and light weight of the instrument is emphasized as permitting measurement of dynamic stresses in structures light in weight themselves, such as airplanes and airships, and models of

bridge and other structures. The device is readily fixed to members under load by means of rubber bands, vacuum cups or other means.

In the "scratch" extensometer a specially cut white diamond bears on a target made of heat-treated steel. The diamond is so mounted that it is always under a small but adjustable load. The strain in the member under test causes the diamond to scratch a record on the target. Simultaneously the target is under a resultant force, manually variable, to move at right angles both to the axis of the instrument and to that of the diamond. One coordinate of the record indicates strain; the other coordinate has no meaning, but is availed of in order that the record may be had over a period of time more or less extended as fixed by the variability

of the resultant transverse force and the amount and the rate of strain variation. There is no motion of the target when there is no change of strain; small changes in strain cause correspondingly small transverse movements of the target.

Strains are evaluated from the record by filar microscopes which may be of the moving eyepiece or of the moving table type. The record may also be photographed microscopically and the print measured directly. With known magnification, strain (and therefore stress) becomes determinable. From 100 to 500 diameters magnification is needed depending upon the nature of the record made. One photomicroscope such as ordinarily used in metallography or one filar microscope suffices for the measurement of a multitude of targets. The targets may be filed away like correspondence.

An important advantage of the "scratch" extensometer is said to be that no multiplying system is needed on each instrument, a feature that reduces materially the cost of manufacture.

Pipe-Line Welding Blowpipe

ALTHOUGH developed primarily for pipe line work, the Oxweld type W-22 welding blowpipe marketed by the Linde Air Products Co., 30 East Forty-second Street, New York, is suitable for other uses. It is similar to the Oxweld type W-17 blowpipe except that the oxygen and acetylene valves are located on the front of the handle, so that flame adjustments may be made more readily while the blowpipe is in operation. The acetylene valve is on the left-hand side of the handle convenient to the operator's right thumb, and the oxygen valve is located on the under side of the handle. With this arrangement, it is unnecessary for the operator to use his

left hand, which holds the welding rod, to adjust the blowpipe valves.

A feature is the long acetylene passageway between the acetylene valve and the injector, which minimizes the possibility of flashback. This is accomplished by having three acetylene tubes between the rear and front bodies. The acetylene comes from the



hose connection up to the valve in the front body, passes through a second tube back to the rear body, thence through a cross drilling to a third tube leading to the injector.

The acetylene valve is of ball-type and consists essentially of a stainless steel sphere which is hardened and ground. This sphere gives a narrow line of contact and is said to eliminate difficulties caused by the deposition of carbon in the valves.

Ingersoll Steel & Disc Co., Chicago, a division of the Borg-Warner Corp., has entered into a license agreement with the Allegheny Steel Co., Brackenridge, Pa., by which the latter will manufacture two-ply stainless steel sheets exclusively under the patents of the Ingersoll company.

Chapmanizing Process for Hardening Steel

By VINCENT T. MALCOLM

Chapman Valve Mfg. Co.,
Indian Orchard, Mass.

IN the course of research work in connection with the hardening of various types of steel, the metallurgical laboratories of the Chapman Valve Mfg. Co. have developed a new process for the surface hardening of low-carbon steels. By this process, which is called Chapmanizing, suitable elements are made to diffuse into the surface layers of the metal. The method is primarily based on the fact that iron or steel will absorb certain hardening elements. It is believed that this development has so wide an

application as to practically revolutionize many phases of the steel business.

The case produced by Chapmanizing is from 0.010 to 0.025 in. deep (as specified), of which one-half is of extreme hardness and is clearly visible in the fractured sample. The hardness decreases gradually until the case merges with the core. The case is of such extreme hardness that it will cut glass. The hardness as measured by the Monotron will range from 750 to 1000 Brinell. This surface is also ductile and is able to withstand considerable pounding without flaking.

There exist countless applications for Chapmanizing, such as machine

parts, parts for typewriters, refrigerators, vacuum cleaners, sewing machines, gages, pins, bushings, and other such work, where extreme hardness is essential to wear resistance. The use of such parts is considerable and will be more so as further industrial applications are developed by the method of Chapmanizing, for this process eliminates one of the most important problems facing industry today, that is, rapid case hardening by some process that will reproduce identical conditions cycle after cycle, so that definite specifications as to case depth and hardness can be readily conformed to.

Chapmanizing marks a distinct step forward in the development of steel hardening, first, because it permits the use of ordinary low-carbon steels for wear resistance service and replaces expensive steels with the consequent elaborate heat treatment; and, second, it reduces the time of treatment to a fraction of that required by ordinary hardening methods.

Variable-Stroke Board Drop Hammer

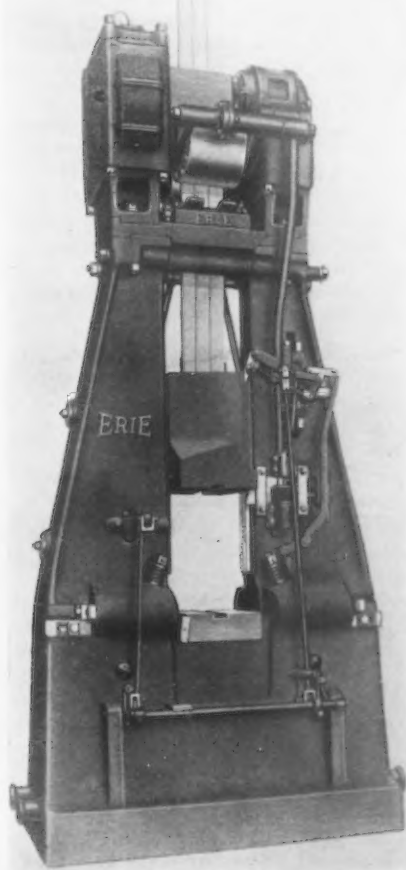
A BOARD drop hammer having variable stroke has been announced by the Erie Foundry Co., Erie, Pa. In this design the length of stroke is not adjusted in the conventional

manner; instead, the operator has available either a light or heavy blow, a short or long stroke, using either at will and without delay. The hammer is treadled with one foot in the usual manner, and the length of stroke is governed by a slight rocking of the foot on the treadle.

The illustration shows the variable stroke arrangement on an Erie type M motor-driven board drop hammer. The construction is simple and the equipment can be applied to existing

hammers at moderate expense. Recent tests indicate considerable saving in power when striking short blows, but a factor even more important, from a production standpoint, is the increase in speed.

With the stroke and blow subject to instant variation, board drop hammers of this design are adapted for making drop forgings in which the cross section is large at one point and comparatively small at another, and such forgings can be made without lowering of the production rate or cooling of the metal between the drawing down and finishing impressions.



Compact Motor and Speed Reducer Unit

SMOOTH and quiet operation, compactness and permanent alignment of parts are features of the horizontal "MotoReduceR" brought out by the Philadelphia Gear Works, Inc., Philadelphia.

The motor and gear apparatus is self-contained in a single housing, and supporting feet are provided at each end of the frame to eliminate overhang of the gear or motor. Gears are made from heat treated nickel steel. They have helical cut teeth and run in a bath of oil. All bearings are of anti-friction type. The slow-speed shaft is mounted on oversize Timken roller bearings generously spaced, which permits overhanging a pinion, sprocket or pulley without the use of an outboard support.

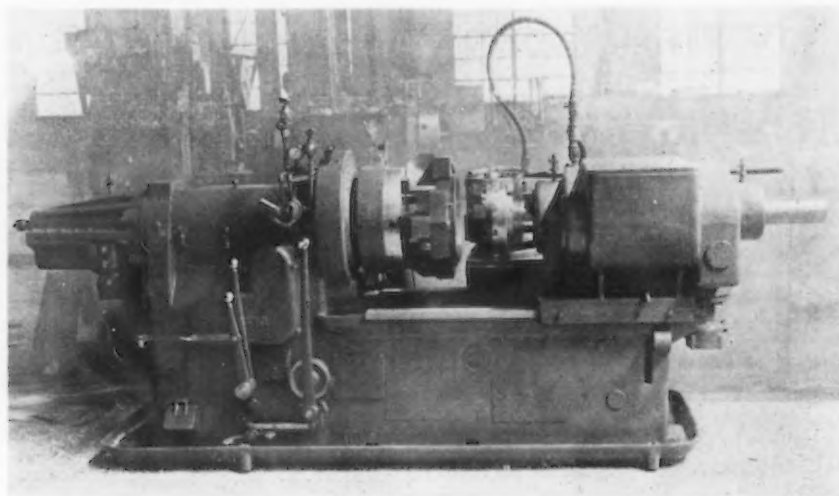
This motor and speed reducer combination is made in single, double and

triple types with ratios up to 450 to 1, and can be furnished with standard open-type or entirely-enclosed fan-cooled motors, single and polyphase. It can also be furnished with direct current motors up to 10 hp.

A new line of quick-operating small snap gages has been added to the regular line of the Taft-Peirce Mfg. Co., Woonsocket, R. I.



Feet at each end of the housing eliminate overhang of gears and motor.



Malleable Iron Automotive Brake Drums Machined Rapidly

FOR roughing out a front wheel hub and brake drum consisting of a single special malleable iron casting the Gisholt Machine Co., Madison, Wis., recently furnished the specialized equipment here illustrated.

In this machine a fixed tailstock housing replaces the company's standard Simplimatic traversing platen table. This housing carries a boring spindle actuated by a large diameter continuous cylindrical cam and the necessary gearing to complete the feed mechanism.

In place of the customary air chucking equipment is a wrenchless chuck operated by an air cylinder mounted on the rear side of the machine. This leaves the bore of the work spindle clear for the addition of a back boring attachment.

When the machine is started, all tools traverse rapidly to their starting positions. The boring head carries 12 tools for roughing out the 14-in. x 3 3/16-in. braking surface and six tools for the inside tapered roller bearing seat in the hub. The back boring attachment carries a six-cutter boring head for the outside tapered roller bearing. The rear slide, mounted at a 45-deg. angle with the axis of the work, carries tools for chamfering the bore, facing and for turning the outside diameter. There are a total of 27 cutting tools and blades feeding in four different directions.

Use of cemented-carbide tools permitting higher cutting speeds and multiple-cutter boring heads permitting heavier feeds helps the machine to turn out these drums in 1 1/4 min. each, floor to floor.

The second operation of facing the wheel seat and finish boring the bearing seats; and the third operation of finish single point boring the braking surface concentric with the tapered roller bearing cups are performed in

1 1/4 min. and 2 1/2 min. respectively, in Gisholt Simplimatics of a more standard nature.

Rubber Belting and Equipment for Splicing

THE B. F. Goodrich Co., Akron, Ohio, has brought out a new rubber belting designated as the Highflex Junior for use where factory-made endless belts or belts laced with conventional types of fasteners cannot be installed. With this belting is offered a portable vulcanizer and other equipment for making belts endless after being applied to the machine on which they are to be used.

This belting is furnished in widths up to 6 in. It is made up of a greater number of plies of a woven fabric designed to give the characteristics for belting spliced endless on the machine.

A special cement and tie gum has

been developed for making the splice, and a line of automatically-controlled portable electric vulcanizers, made by the James C. Heintz Co., Cleveland, is available. A light template has been designed for laying out and stepping down the ends of the belt. All necessary hand tools are included in the equipment, which is portable and convenient to handle.

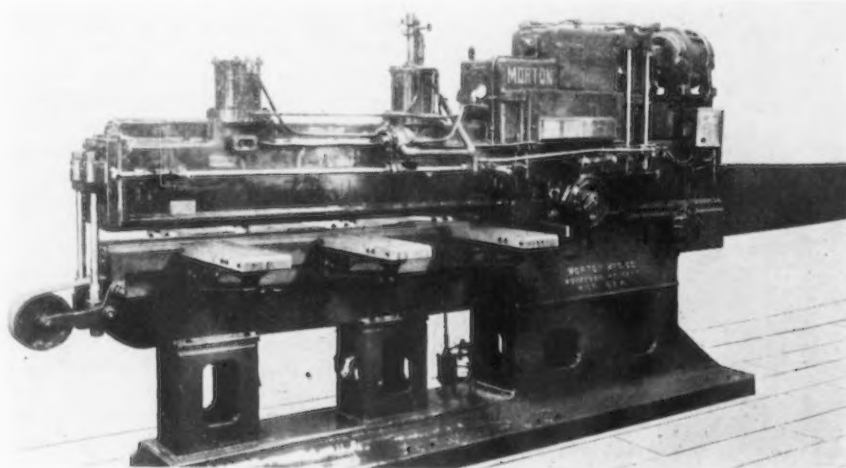
Trims Welding Flash from Sheets and Plates

FOR removing the flash or upset produced in butt welding sheets and plates, the Morton Mfg. Co., Muskegon Heights, Mich., has recently built the 72-in. stroke draw-cut flash trimmer here shown.

The machine is said to be used also for salvaging scrap and trimming new sheets of various widths. It is similar to the company's 40-in. flash trimmer described in *THE IRON AGE* of July 14, page 69. Two rams trim both sides of the sheet in one operation. The cutting cycle is completed on the inward or draw cut stroke. Clamping of the work is by means of air cylinders which compensate automatically for variation in the thickness of the sheets.

Rams are reciprocated by means of reversing clutches which are so controlled that the machine makes one cycle and then stops. Before reversal takes place, the upper ram raises a distance of 2 in., thus making possible easy removal of the work while the rams are returning to their outer positions. The rams carry multiple cutting tools which are adjustable for height and also straightening rollers that precede the tools.

A special air chuck operating through eccentrics and rollers serves to raise the sheet automatically from the dies when aligning the work for the trimming operation or when removing it after the trimming operation. Machines of the same type can be built with any desired length of stroke.



Morton 72-in. stroke flash trimmer. The work is clamped pneumatically and both sides are finished at one stroke.

R.F.C. Grants First Railroad Loan for Equipment Building

Pennsylvania to Receive \$2,000,000 for Building 1285 Cars—
Other Projects Close to Formal Action

WASHINGTON, Sept. 20.—In announcing its approval yesterday of a \$2,000,000 loan to the Pennsylvania Railroad for the construction of 1285 freight cars, the Reconstruction Finance Corporation estimated steel requirements at 30,000 tons. This compares with 19,000 tons estimated by President Atterbury of the Pennsylvania for the 1500 cars which it was originally proposed to build. The equipment will consist of 925 all-steel box and 360 automobile box cars of various types.

The Central Railroad of New Jersey has applied for a \$500,000 loan for car repairs. The Chicago & Eastern Illinois Railroad proposes to purchase 1130 tons of 110 lb. rails, together with the necessary track material, if granted its application for a loan of \$100,000 from the Reconstruction Finance Corporation. The cost of the rails is placed at \$50,850 and that of tie plates, bolts, spikes and miscellaneous track material at \$36,650. It is intended to lay the rails this year. The president of the company, according to the application, declared that it has no steel rails on hand for replacement of wornout rails and that it is necessary to buy new rails.

Application for a loan of \$36,450,000 to proceed with the Chicago sanitary district project was filed last week with the Reconstruction Finance Corporation. The application was not made public. Requirements for the project are said to include some 25 or 30 sewage disposal plants, pipe and other materials of iron and steel.

San Francisco Bay Bridge Being Considered

Conferences for proposed loans on self-liquidating projects are numerous. One of the greatest projects involved in discussions with the board of engineers of the Reconstruction Finance Corporation relates to the San Francisco bay bridge. The estimated structural requirements are 100,000 tons, according to the American Institute of Steel Construction. The approximate cost is \$75,000,000. A great deal remains to be done, it is said, before action is taken. One point yet to be determined is the probable traffic over the bridge.

Informal discussions also have taken place with regard to loans for a bridge across St. John's River at Jacksonville, Fla., calling for 7000 tons of structural steel. A proposed loan likewise was discussed for the Miami, Fla., international airport.

President W. Roscoe Bonsal of the Chesapeake Bay Bridge Co. is quoted as saying he expects early action by the Reconstruction Finance Corporation on the company's application for a loan of \$7,500,000 for the construction of a bridge. The bridge would require 22,000 tons of steel, according to the institute.

The Reconstruction Finance Corporation last Saturday announced approval of loan of \$3,850,000 to the Denver & Rio Grande Western Railroad for the construction of the Dotsero cut-off. It is estimated that it will require 950 tons of structural steel. It will also call for steel rails and the necessary track accessories.

Wharton Blast Furnaces Are Sold for Scrap

The Warren Foundry & Pipe Corp., Phillipsburg, N. J., has sold its blast furnaces at Wharton, N. J., to the Bethlehem Steel Corp. for \$25,000. The furnaces will be dismantled and will be used by the Bethlehem company for scrap. Originally owned by the Wharton Steel Co., the two stacks were purchased by the Replogle Steel Co. in 1919 and were rebuilt by the latter concern in 1920. Warren Foundry & Pipe Corp. succeeded to their ownership when it absorbed the Replogle company in 1924. The stacks have been idle for nearly 10 years, and the sale was effected by Warren in an effort to reduce tax expenditures on non-productive units.

American Steel Exports at New Low in August

WASHINGTON, Sept. 20.—Exports of iron and steel in August struck low point of 32,955 tons. Imports were only 23,623 tons.

Molybdenum Sales Make Good Showing

Molybdenum sales by the Molybdenum Corp. of America, New York, one of the two companies in the world engaged in this business, in the first eight months of 1932 were approximately 75 per cent of those in the peak year, 1929, according to the officials of the company. The steel industry,

the principal source of molybdenum consumption, is showing a much larger decline in the use of this ferro-alloy because of the current low volume of ingot production, but numerous new uses for the material have been discovered and put into practice. Fifty per cent of the molybdenum business of the Molybdenum corporation in 1931 was derived from new uses not in existence in 1929 and further new applications have been developed this year.

Machine Specialty Co.'s Business Active

The Machine Specialty Co., Ann Arbor, Mich., has enjoyed good business during the past two years. This company manufactures piston pins and other hardened and ground automobile parts intended chiefly for repair work. It attributes this activity, first, to the fact that the general line is one which has not suffered as much as most other lines during the depression—a line which perhaps has benefited, because automobile owners in general have made more repairs than usual instead of buying new cars. A second reason for good business is credited to its sales department for taking advantage of all factors in the situation and for working out successful plans for selling the company's products, including extension of credit, after first making an investigation to determine the financial soundness of the customer. In addition to all this, the company has been able to introduce manufacturing economies which have brought down the cost of production.

Enlarges Electroplating Research Laboratory

For several years the New Jersey Zinc Co. has been actively engaged in electroplating research. This has involved the plating of hundreds of samples with nickel, nickel-chrome, chromium, copper, brass, bronze, cadmium, etc., to determine proper plating methods. As the work has expanded in cooperation with several industries, new equipment has been found necessary. This has until recently been of the laboratory type. It has now been considerably augmented by tanks and a generator unit of semi-commercial size, enabling the company to develop and demonstrate practically various electroplating methods for rolled zinc and zinc die castings.

The work done in the laboratories and the information received through cooperative runs in industrial plants have been incorporated in a research bulletin, "The Plating of Rolled Zinc and Zinc Die Castings," published by the company.

Malleable Institute Head Forecasts Railroad Buying

Toronto Meeting Marked by More Hopeful Sentiment; New Uses
and Rise in Fixed Costs Discussed

THE early inauguration of a reasonably wide rehabilitation program by the railroads was forecast at the September meeting of the Malleable Iron Research Institute in Toronto, Ont., by its president, E. E. Greist, who in an address stated that his feeling of pessimism had been changed to one of optimism as a result of recent conferences with railroad executives, including heads of mechanical departments. Mr. Greist is acting vice-president of the Chicago Railway Equipment Co., Chicago. He expressed the belief that, as a result of the assistance of the Railroad Finance Corporation, the activities of the committee appointed to promote railroad purchases for replacement, and through the aid of the more recently organized Railroad Equipment Credit Corporation, the railroads would secure ample funds to put their rolling stocks in shape.

Some of the operating executives of the railroads told him that they did not have enough equipment in shape to handle an appreciable increase in traffic.

The meeting of the institute, which was held at the Royal York Hotel, Sept. 14, was fairly well attended and there was an interesting program.

Reports on trade conditions indicated some spotty improvement in orders for castings. Shops making automobile castings do not expect much business in the remainder of the year, but a marked improvement is expected next year.

New Uses for Malleable Iron Uncovered

A report on new and proposed uses for malleable iron, based on a recent survey of the members, was presented by Robert E. Belt, secretary-treasurer. This showed that 42 new parts had been added to the list of malleable iron products in the last four months. A wheel carrier for a barn door hanger, which was exhibited, attracted interest. This is a one-piece malleable casting, which is much stronger and lighter in weight than a built-up carrier that it has replaced. Several prospective uses for malleable castings were suggested. The survey showed that in most cases where parts had gone from malleable iron to other materials it was because of a change in the design of the part. A manufacturer of road scrapers had gone back to malleable castings because the parts for which another material had been substituted had not held up.

An interesting report on the increased cost of malleable iron, due to increases in freight rates, taxes, power and other fixed charges, was submitted by Mr. Belt. This showed that the fixed costs over which the foundryman has no control have, with the normal operations, increased 2.2 times since 1914. One-half of the inflation in labor costs that occurred between 1914 and 1924 has been wiped out and no further appreciable reduction is looked for. The freight costs of raw material for a ton of castings in the Central district increased from \$5.26 in 1914 to \$9.15 in 1932, the report showed. The average freight charge on castings shipped increased from

\$7.80 to \$14.40 in the same period. Costs other than labor, freight and taxes and other items beyond the control of the foundryman are now down to pre-war level the report indicated. Any additional appreciable reduction cannot be hoped for, and if foundrymen are to make a better financial showing they must get higher prices for their castings.

Shortening the Annealing Cycle

A report on the tendency toward the use of small-capacity, well insulated annealing ovens, resulting in the shortening of the annealing cycle and quicker deliveries, was made by Prof. Enrique Touceda, consulting engineer. He said that with small-size and well insulated ovens the annealing cycle can be shortened 25 per cent without any reduction in the actual annealing time. The result of his findings will be published shortly in a bulletin.

The Canadian Malleable Association held a joint meeting with the institute during its first day session and the meeting was addressed by John C. Notman, McKinnon Industries, Ltd., president of the Canadian association.

Pittsburgh Steel Co.'s Loss \$2,501,081 in Year

The Pittsburgh Steel Co., Pittsburgh, and subsidiaries, in the year ended June 30 had a net loss of \$2,501,081 after all charges, including depreciation, depletion and bond interest. This compares with a loss of \$1,713,726 in the previous fiscal year. Balance sheet as of June 30, 1932, shows net current assets of \$15,432,071 as compared to liabilities of only \$1,724,452.

During the year \$216,083 was expended for betterments and improvements and in the acquisition of new properties. Maintenance repairs and replacements during the year amounted to \$1,155,000.

In commenting upon the current business situation, Homer D. Williams, president, stated that "all indications point to an improvement this fall which we hope will continue through the winter and the spring."

Ornamental Iron Work Conference Oct. 3

Ornamental iron, bronze and wire products manufacturers will participate in discussions of irregular trade methods at the trade practice conference, which has been called for the industry by the Federal Trade Commission, at the Hotel Riverside, Cambridge Springs, Pa., on Oct. 3. Price-cutting, irregular bidding, inferior materials and workmanship and other

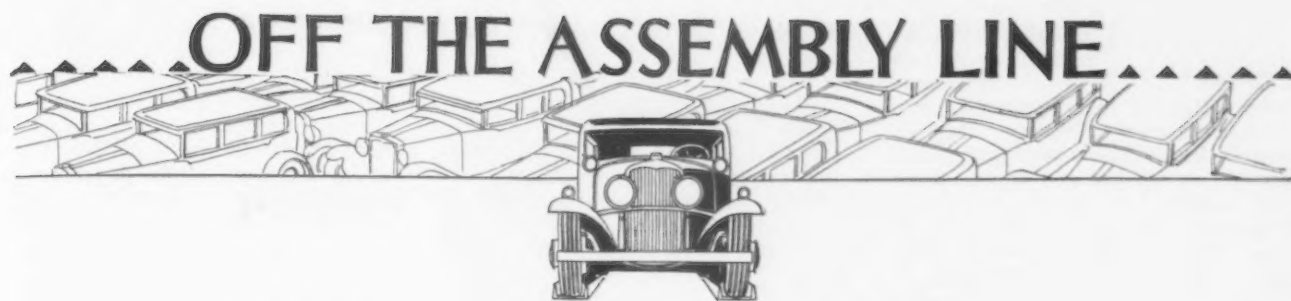
unfair trade methods will be discussed. Judge George McCorkle, acting director of trade practice conferences for the Federal Trade Commission, will propose rules which he is formulating to conform to the trade commission's regulations and which will be designed to eliminate insofar as possible abusive trade practices in the industry.

Unfilled Sheet Orders Gained in August

Sales of steel sheets by independent makers during August were virtually the same as in July, according to the monthly report of the National Association of Flat Rolled Steel Manufacturers. Production and shipments fell off slightly and unfilled orders on Sept. 1 showed a little gain. August sales were 66,132 tons, or 17.6 per cent of capacity, compared with 66,301 tons during July. Production was 57,417 tons, against 60,956 tons the previous month. Unfilled tonnage Sept. 1 was 81,283 tons, compared with 77,432 tons Aug. 1. The August report and comparison in net tons follow:

	August	July	June
Sales	66,132	66,301	85,191
Production	57,417	60,956	85,232
Shipments	61,284	73,191	90,157
Unfilled orders.....	81,283	77,432	85,195
Unshipped orders....	49,029	46,068	47,304
Unsold stocks.....	58,651	68,450	74,642
Capacity per month.	550,000	547,000	547,000
Percentage reporting	68.4	68.2	68.2

Percentages, Based on Capacity			
Sales	17.6	17.8	22.8
Production	15.3	16.3	22.8
Shipments	16.3	19.6	24.2
Unfilled orders.....	21.6	20.7	22.8
Unshipped orders....	13.0	12.3	12.7
Unsold stocks.....	15.6	18.3	20.0



Buick Buys Steel for 10,000 Cars; Other Makers Are Inquiring

DETROIT, Sept. 19.

THE steel trade is finding encouragement in developments of the past week. The Buick Motor Co. has given releases for steel for 10,000 of its new models, which should be in production early in October. The Ford Motor Co. likewise has instructed some of its steel suppliers to ship small tonnages to the Rouge plant, while Pontiac is reported to have placed a few steel orders. Oldsmobile is asking for prices on steel for the first run of its new models and Chrysler is now allocating its fourth quarter steel business. Packard is taking quotations on material to cover its cars to be built for the show period and to stock dealers. Thus the trend is in the right direction, although actual steel purchases have been relatively light.

Hopes of a steel buy on the part of the Ford company this month are fading. Ford is gearing production closely to sales and its schedules next month are now uncertain. It has considerable steel on hand for current requirements and in some cases has released tonnages, orders for which were placed 60 to 90 days ago. Certain mills still are waiting for releases on old orders, but when they come they will not mean increased rollings, as the material already has been made and is being held at the mills pending shipping word from Dearborn. About the only solace to be gained is the probability of small steel orders being placed in the process of balancing up various items. The Ford open-hearths remain idle and may not resume for some time.

New Chevrolet in December

Chevrolet will not have its new car ready as early as anticipated. The pressure of an unexpected pickup in retail sales necessitated the production of 6000 to 7000 more cars of the present series than the company had judged it would need, so that production at the local gear and axle plant, the Flint factory and Saginaw foundry continued up through last week.

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Chevrolet reverses seasonal trend by selling at retail 8529 cars in first 10 days of September, compared with 7688 in same period of August.

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Chrysler is now placing its fourth quarter steel contracts. Oldsmobile and Packard are inquiring for steel.

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▼ ▼ ▼
Chevrolet's new car will not be announced until December.

The foundry worked five days the past week and four days the previous week. However, it shut down last Friday night with the reopening date undetermined, although it may begin its first run of 1933 cylinder blocks on Oct. 3. The manufacturing divisions are planning to get under way the latter part of October and the branch assembly plants about Nov. 15, with the public showing of the car, still a six, set for early December. It is not likely therefore that steel will be bought by Chevrolet until early October. The Saginaw foundry now has its winter's supply of pig iron on hand, the boat with the final tonnage from Buffalo having delivered its cargo last week.

Retail Sales Improve

Chevrolet's improvement in retail sales has carried over into September, the first 10 days of which ran ahead of the corresponding period in August. The biggest gains were in the Dallas Tex., and Atlanta districts, where the rise in cotton prices has aided recovery. It is true that September usually shows a gain over August, but the increase rarely comes until the second 10-day period. Plymouth is getting into production on its new car, which will be a six, and may have a comparatively early showing of it. Some departments, such as the one

making crankshafts, are reported to be active on the 1933 job. Dodge and DeSoto are preparing for an aggressive campaign, with the former said to be giving much attention to a small job. Mr. Chrysler has revamped the Plymouth and DeSoto lines the past year and now is understood to be thoroughly overhauling the Dodge cars, the demand for which has scarcely kept pace with the betterment in position of both Plymouth and DeSoto.

Buick and Chevrolet will be the first General Motors units to get started, to be followed by Pontiac. Oldsmobile will delay so that its appearance, like that of Cadillac-LaSalle, probably will be timed to coincide with the New York show. The much-talked-about small car, reported to be similar to the Opel manufactured by General Motors in its German plant, apparently will not materialize this fall. At least it has not got beyond the planning stage. Willys-Overland is scheduling new models, but assemblies are expected to be light in the next 30 days. Continental-DeVaux is reported to be contemplating an invasion of the lowest-price field and in the past week has acquired the services of F. L. Rockelman, who has resigned as president of Chrysler's Plymouth division and previously was a high Ford executive.

Detroit Notes

Pig iron shipments in the Detroit district in the first half of September exceeded those in the entire month of August . . . Briggs Mfg. Co., in its plans for diversification, is considering the manufacture of bathroom fixtures and other sanitary products to be made from vitreous enameled steel. Briggs the past year has made satisfactory progress in the refrigeration cabinet field . . . It is estimated that commercial car sales in August equaled or slightly exceeded those in July . . . Detroit believes that Studebaker has strengthened its position by the acquisition of the White Motor Co. . . . One of the important car

makers in the higher price group has not bought a carload of steel since February . . . Nineteen thirty-three cars will have less brightly-finished parts than current models. This applies to both rustless steel and chromium-plated finishes and is due partly to a style trend away from such finishes and partly to the necessity for production economies . . . Steel prices are showing greater strength, al-

though the situation locally is somewhat muddled by carry-overs on second as well as on third quarter contracts . . . Buick has tentatively set 57,000 cars as its manufacturing schedule for 1933, thus showing that General Motors believes that the recovery from the depression will be slow. It is believed that Buick turned out about 40,000 to 45,000 of its 1932 models, introduced last November.

OBITUARY



J. W. KIRKPATRICK

JOHN W. KIRKPATRICK, chairman of the board of the West Leechburg Steel Co., Pittsburgh, died in a hospital at Oil City, Pa., on Sept. 16 as the result of injuries received in an automobile accident a few days before. He was born at Allegheny, Pa., now North Side, Pittsburgh, in 1859, and attended local public schools and the Chester Military Academy. He entered the iron and steel industry with his father, John C. Kirkpatrick, in Kirkpatrick & Co., Ltd., Leechburg Iron Works, continuing in that organization until 1900, when the American Sheet Steel Co. was formed. He helped to organize the West Leechburg company in 1897, and had been associated with it continuously since that time. Mr. Kirkpatrick was prominently identified with social and civic affairs in the Pittsburgh district, and his long experience in the steel industry had won him many friends.

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JOHN STUART MURRAY, director of purchases for the Aluminum Co. of America, Pittsburgh, died at his home in that city on Sept. 14, aged 57 years. He was a native of Pittsburgh and had spent the greater part of

his business career with the Aluminum company.

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DAVID JONES MARSHALL, president of the Speck-Marshall Co., Pittsburgh, mine supply equipment, died on Aug. 28.

Studebaker Corp. Buys White Motor Co.

The Studebaker Corp., South Bend, Ind., has acquired the White Motor Co., Cleveland, the terms of the purchase agreement calling for the retention by the latter of its identity as an operating unit. The transaction marks another step in Studebaker's program for making itself an increasingly important factor in the automobile business. In 1928 Studebaker acquired Pierce-Arrow to give it a position in the quality car field and two years later it offered the Studebaker six to make more firm its place in the \$1,000 car field. This year it introduced its Rockne car, made by Rockne Motors Corp., a subsidiary at Detroit, to tap the large field just above the lowest price cars. In 1931 it greatly strengthened its standing in the commercial car field. With the purchase of the White company it brings into its ranks one of the dominant interests in the medium and heavy duty truck and bus field.

Oglebay, Norton and Lavino Join Forces

E. J. Lavino & Co., Philadelphia, and Oglebay, Norton & Co., Cleveland, announce a consolidation of sales activities, effective Oct. 1, whereby Oglebay, Norton & Co. will undertake a broader distribution of ferroalloys and raw materials and the Pittsburgh and Chicago offices of E. J. Lavino & Co. will devote their entire efforts to the sale of refractories.

Oglebay, Norton & Co. have been appointed exclusive sales agent for Lavino ferromanganese and spiegel-eisen in all districts except the Eastern seaboard, and will open branch offices in Pittsburgh and Chicago for the distribution of these and other

products. They will direct all of their activities from their general offices in the Hanna Building, Cleveland. Their Pittsburgh office will be at 1842 Oliver Building, in charge of R. E. Runyon, and the Chicago office at 208 South La Salle Street, in charge of H. W. Grigsby. Both Mr. Runyon and Mr. Grigsby were formerly with E. J. Lavino & Co.

E. J. Lavino & Co. will continue all the activities of their general offices in Philadelphia; however, the district offices in Pittsburgh and Chicago will confine their efforts to the sale of refractories, principally chrome brick, magnesite brick, chrome ores and special refractory materials. R. E. Griffith, general manager of sales, is moving his headquarters from Philadelphia to the Oliver Building, Pittsburgh, from which point he will direct all refractory sales and engineering. Gaylord P. Stowe will be in charge of the engineering department and J. B. Luckie, H. W. Pigott and J. W. Corriston in charge of the district offices in Pittsburgh, Chicago and Philadelphia, respectively.

California Aqueduct to Be Started Soon

WASHINGTON, Sept. 20.—Work on the 239-mile aqueduct to be built by the Metropolitan Water District of southern California will begin in the immediate future. The Reconstruction Finance Corporation, which has arranged a loan of \$40,000,000 for the project, the first self-liquidating undertaking to be granted funds of the Government organization, has detailed the construction program included in the \$40,000,000 loan.

Among other items, in addition to those published in THE IRON AGE of Sept. 15, page 416, are the following: 180 miles of pipe weighing 3700 tons for temporary water system; 50 electric pumping units; well casing; storage tanks; booster pumps; great deal of miscellaneous material; power line system comprising 323 miles of high-tension transmission line; 271 miles of distribution lines and six substations; 30 large and 400 small transformers; 600 condensers; 30 hoisting outfits; 100 air compressors; 300 rock drills; 40 drill sharpening outfits; 40 motor generator sets; 60 tunnel shovels and mucking machines; 10 drag-line excavators; 25 tractors; 150 trucks; five concrete mixing plants; 15 derricks and hoists; 150,000 ft. of ventilating pipe; 1000 tons of pipe for compressed air and water lines.

Before the work is completed it will require much additional material.

Acting upon the request of those interested, the Tariff Commission has postponed from Oct. 20 to Dec. 8 the public hearing to be held on the application for an increase in the duty on fluorspar.

PERSONALS

HERMAN H. LIND, Cleveland, has been appointed general manager of the National Machine Tool Builders' Association. Mr. Lind served for nearly two years as general manager of the Malleable Iron Research Institute, Cleveland. A few months ago he returned to his former work as business consultant and negotiator for industries, in which he had been engaged since 1922 except for the period in which he was connected with the institute. He also had other contacts with association work as an active member of organizations. He is about 48 years old and was born in Middlebranch, Ohio. After graduation from high school in Canton, Ohio, he was employed by the Columbus Buggy Co., Columbus, Ohio, as factory clerk in charge of storeroom and later as assistant purchasing agent. After two years with this company, he became bookkeeper for the Ohio Blower Co., Cleveland, for which he later became treasurer and also looked after initial sales work in creating and directing sales agencies. He remained with the Ohio Blower Co. for 17 years during which he gained broad executive experience. On severing his connection with that company, he took up the work to which he has devoted most of his time during the past 10 years.



HERMAN H. LIND

transferred to the St. Louis office, and in August, 1917, he was made chief clerk in that office. Following a brief period in the Army, he returned to the Carnegie company, and in July, 1919, became chief clerk in the Detroit office. He took up active sales work in March, 1921, and on Jan. 1, 1928, became assistant sales manager in that district.

FRED L. ROCKELMAN has resigned as president and general manager of the Plymouth Motor Corp., Detroit, division of the Chrysler Corp., to become associated with Continental Motors Corp., Detroit. For many years he was sales manager of the Ford Motor Co. and later general manager of the Detroit, Toledo & Ironton Railroad under Mr. Ford's ownership.

FRANK L. GIBBONS, heretofore identified with the Republic Steel Corp., has been appointed director of steel sales for the Timken Steel & Tube Co., Canton, Ohio. He has been associated with various alloy steel manufacturers in a sales capacity since 1914, when he was with the old Carbon Steel Co. Subsequently he was engaged in sales work in Pittsburgh, Cleveland, Detroit, and Massillon, with the Central Steel Co. and the Central Alloy Steel Co.

J. J. ZIMMERMAN has resigned as manager of production for the Elliott

Co., maker of power plant equipment, Pittsburgh. Prior to his connection with the Elliott Co., he served the Cambria Steel Co. in various capacities from machinist to engineer, and the Reading Iron Co., as assistant general superintendent. He is at present acting as production consultant and has not decided on any definite plans for the future.

WILLIAM S. CULVER, who has concluded 47 years in the employ of the General Electric Co. and its predecessors, for the past 25 years as district engineer of the east central district of the company, with headquarters at Cleveland, will retire from active duty at the end of this month. He is a pioneer in the electrical industry. In the fall of 1885, he entered the shops of the Brush Electric Co., and was sent on his first outside job in 1887. Later he spent considerable time in Manila installing electric light plants, and upon his return to this country entered the Lynn plant of the General Electric Co. and was transferred to the east central district in 1902. He is being succeeded by C. W. FICK, heretofore assistant district engineer.

JOHN A. COAKLEY, vice-president of the American Sheet & Tin Plate Co., Pittsburgh, has been appointed general traffic manager of the American Bridge Co., American Sheet & Tin Plate Co., American Steel & Wire Co., Carnegie Steel Co., H. C. Frick Coke Co., Illinois Steel Co., Lorain Steel Co., and National Tube Co., all subsidiaries of the United States Steel Corp. Effective Oct. 1, Mr. Coakley's headquarters will be in Pittsburgh.



A. L. SONNHALTER, who, as announced in these columns on Sept. 1, has been made vice-president in charge of operations of the Pittsburgh Crucible Steel Co., Pittsburgh.



J. H. MCKOWN

Seven Societies Join in National Metal Week at Buffalo

ARRANGEMENTS are nearly completed for the National Metal Congress and the National Metal Exposition to be held in Buffalo, N. Y., Oct. 3 to 7, under the sponsorship of the American Society for Steel Treating. Several other national organizations in the metal working field are to cooperate. This year, in addition to the technical program of the A. S. S. T., sessions have been arranged by the institute of metals and the iron and steel divisions of the American Institute of Mining and Metallurgical Engineers, the machine shop practice division of the American Society of Mechanical Engineers, the American Welding Society, the production activity division of the Society of Automotive Engineers, the Wire Association and the American Drop Forging Institute.

All societies participating in the Congress will make their headquarters in the Hotel Statler, where the morning technical sessions of each organization will be held. Arrange-

ments have been made for all afternoon sessions at the 174th Regiment Armory where the metal exposition of about 100 exhibitors will be held.

The A. S. S. T. has arranged a program of 30 technical papers scheduled for the morning and afternoon of each day of the week. These include such general topics as research, sheet and strip steel, high-speed steel, corrosion-resisting steels and others.

At the convention of the welding society, which is the annual fall meeting, 28 papers are scheduled for the sessions which start on Monday afternoon and close with the annual dinner and dance on Thursday evening, Oct. 6. One of the strongest programs in recent years is promised.

A varied program of 13 papers has been arranged by the non-ferrous and steel divisions of the mining engineers, to be held Wednesday and Thursday, Oct. 5 and 6. At the usual dinner, held this year on the evening of Oct. 5, Dr. Zay Jeffries will de-

liver a non-technical address on "Tungsten."

The machine shop practice division of the A. S. M. E. has arranged a program of six papers for Monday afternoon and evening, Oct. 3. The program is correlated with that of the S. A. E. which will hold a session the same day in the morning, for which three papers are planned. There will be a joint luncheon of the two societies at noon.

Six papers are scheduled by the drop forging institute for the afternoon of Tuesday, Oct. 4, and the morning following. At the six sessions of the wire association on Oct. 4, 5 and 6, seven papers have been scheduled.

The annual Campbell Memorial Lecture will be delivered this year by Edgar C. Bain, research metallurgist, United States Steel Corp. Research Laboratories, Kearny, N. J., on Wednesday morning, Oct. 5. His subject is "Factors Affecting the Inherent Hardenability of Steel." The annual banquet of the A. S. S. T. is scheduled for Thursday evening, Oct. 6.

The companies which are listed as exhibitors at the National Metal Exposition are found below.

EXHIBITORS AT NATIONAL METAL EXPOSITION

Air Reduction Sales Co., New York.
Ajax Electric Co., Inc., Philadelphia.
Ajax Electrothermic Corp., Trenton, N. J.
American Brass Co., Waterbury, Conn.
American Car & Foundry Co., New York.
American Cyanamid & Chemical Corp., New York.
American Electric Furnace Co., Boston.
American Gas Association, New York.
American Gas Furnace Co., Elizabeth, N. J.
American Lubricants, Inc., Buffalo.
American Steel & Wire Co., Chicago.
Armstrong Cork & Insulation Co., Lancaster, Pa.
Aurora Metal Co., Aurora, Ill.
Bausch & Lomb Optical Co., Rochester, N. Y.
Bell & Gossett Co., Chicago.
Bethlehem Steel Co., Bethlehem, Pa.
Brace-Mueller-Huntley, Inc., Buffalo.
Buffalo, Niagara & Eastern Power Corp., Buffalo.
Carboloy Co., Inc., Detroit.
Carborundum Co., Niagara Falls, N. Y.
Case Hardening Service Co., Cleveland.
Chicago Steel Foundry Co., Chicago.
Cling Surface Co., Buffalo.
Columbia Tool Steel Co., Chicago.
Dearborn Chemical Co., Chicago.
Dow Chemical Co., Midland, Mich.
Eisler Electric Corp., Newark, N. J.
Electro Metallurgical Co., New York.
Electro Refractories & Alloys Corp., Buffalo.
Ensign-Reynolds, Inc., New York.
Erie Malleable Iron Co., Erie, Pa.
Falls Electric Furnace Corp., Buffalo.
Firth-Sterling Steel Co., McKeesport, Pa.

Gas Machinery Co., Cleveland.
Gathmann Engineering Co., Baltimore.
General Alloys Co., Boston, and Champaign, Ill.
Global Corp., Niagara Falls, N. Y.
Grasselli Chemical Co., Cleveland.
Harnischfeger Corp., Milwaukee.
Haynes Stellite Co., Kokomo, Ind.
Heppenstall Co., Pittsburgh.
Hevi Duty Electric Co., Milwaukee.
Hollup Corp., Chicago.
Hones, Inc., Charles A., Baldwin, N. Y.
Houghton & Co., E. F., Philadelphia.
Illinois Steel Co., Chicago.
Illinois Testing Laboratories, Chicago.
International Nickel Co., Inc., New York.
IRON AGE, New York.
Jewell Steel & Malleable Co., Buffalo.
Jones & Laughlin Steel Corp., Pittsburgh.
Kelley Co., J. W., Cleveland.
Kelley-Koett Mfg. Co., Covington, Ky.
Kemp Mfg. Co., C. M., Baltimore.
Lebanon Steel Foundry, Lebanon, Pa.
Leitz, Inc., E., New York.
Lincoln Electric Co., Cleveland.
Linde Air Products Co., New York.
Ludlum Steel Co., Watervliet and Dunkirk, N. Y.
Magnetic Analysis Corp., Long Island City, N. Y.
Manhattan Rubber Mfg. Division, Passaic, N. J.
Marburg Bros., New York.
Metal & Thermit Corp., New York.
Metallizing Co., Los Angeles.
Metals & Alloys, Pittsburgh.
Mill & Factory, New York.
Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Wabash and Elkhart, Ind.

Molybdenum Corp. of America, Pittsburgh.
New Jersey Zinc Sales Co., Inc., New York.
North American Mfg. Co., Cleveland.
Olsen Testing Machine Co., Tinius, Philadelphia.
Otis Elevator Co., Buffalo.
Pels & Co., Henry, New York.
Penton Publishing Co., Cleveland.
Railway Locomotive Co., Chicago.
Republic Steel Corp., Youngstown.
Rinkle Krinkle Paper Co., Boston.
Ripley Co., Cleveland.
Roebbing's Sons Co., John A., Trenton, N. J.
Roessler & Hasslacher Chemical Co., Niagara Falls, N. Y.
Selas Co., Philadelphia.
Spencer Turbine Co., Hartford, Conn.
Stark Tool Co., Waltham, Mass.
Steel, Cleveland.
Steel Publications, Inc., Pittsburgh.
Struthers-Wells Co., Warren, Pa.
Stuart & Co., D. A., Chicago.
Surface Combustion Corp., Toledo, Ohio.
Superior Steel Corp., Pittsburgh.
Terkelsen Machine Co., Boston.
Thomas Steel Co., Warren, Ohio.
Timken Steel & Tube Co., Canton, Ohio.
Union Carbide & Carbon Corp., New York.
Union Drawn Steel Co., Massillon, Ohio.
U S L Battery Corp., Niagara Falls, N. Y.
Welding Engineer Publishing Co., Chicago.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.
Wickwire Spencer Steel Co., New York.
Williams & Co., J. H., Buffalo.

• • EDITORIAL COMMENT • •

Research Marches On

DEFINITE progress in the field of metallurgy, heat treatment and mechanics has been the history of the depression up to this time. Our special survey on other pages of new products and equipment materials in general brings into clear relief many interesting and valuable developments. Among these are new alloy steels, new heat-treating furnaces, particularly as to controlled atmosphere, new welding equipment, improvements in special brick and many special steel and metal products.

The survey, which of course is not all-inclusive, is sufficiently complete to emphasize the fact that research has been active even if business has not. It demonstrates that in many fields and localities the desire to improve has not lost its fervor. It has pressed on, ferreting out new products and improving old ones.

Many new discoveries and improvements have not yet been made public by some of our very large research organizations. Preparation, therefore, for the future and for a recovery in business has been more extensive than we now know. If our survey furnishes only a partial measure of what we may expect, it can confidently be stated that the next few years will witness as great or greater progress than any period since the war. A firm foundation has been laid for new and better products at less cost. Research in all its phases has marched on.

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Defining Obsolescence

OBSOLESCENCE of plant and production equipment cannot be defined by age. Age may be presumptive evidence but it is neither conclusive nor definitive in matters of replacement.

The comparison of results now obtained with results obtainable is the one logical approach to the determination of obsolescence. And even this is not effective unless the plant management has an adequate knowledge of expectable results from all of the appropriate means that may be available.

For example, a machine may be selected which will be far superior to that which it replaces. Yet this improved machine may nevertheless be actually obsolete in terms of the possibilities of one not considered because its capabilities are unknown to the executive in charge.

Especially in the secondary industries, where operations exist in great variety, do we find this a handicap to both maker and user. The lack of definite knowledge of "supremacy areas" of various types of equipment must be overcome before the replacement problem can be solved through scientific selection.

This is a real opportunity for the maker of improved equipment to define obsolescence for his prospective customers in terms of expectable results. There has been too much sales dependence upon features of design and too little upon the concrete assurance of dollar additions to the user's pocketbook.

Taxing an Industry to Death

THAT injudicious and excessive taxation of commodities and of industrial enterprises may be a boomerang is being increasingly demonstrated. It is no secret that in States where the gasoline tax has ascended above a reasonable level, the tax receipts have fallen below expectations, due to the bootlegging of gasoline as well as to decreased consumption.

Now comes the announcement of an even more pertinent case of taxing an industry to death. The Chevrolet Motor Co. has decided to abandon its Janesville, Wis., branch assembly plant, because the operation of the Wisconsin income tax law makes its continuance unprofitable. This year it will require the profits from 45,000 finished cars to pay this tax, although production will be considerably less than that number.

Here, then, is a case where the State has driven out of its bounds a stable industry, thus adding several thousand workers to the already distressingly large ranks of the unemployed and doing great harm to one of its communities. How much better it would have been for the State to be less greedy, less predatory, more solicitous of the promotion of its industries rather than to help to bring about their dissolution.

However, some good may come from Chevrolet's action, for it will awaken Wisconsin legislators and those in other States to the realization that industry will endure a certain measure of injustice, but beyond that point justifiably rebels.

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Progress in Heating and Cooling

ONE of the chief trends in the art of heat treatment of metals in the last few years has been the control of the atmosphere in the furnaces. This has been applied to the electric, oil and gas types. Early practice was to bring the metals up to temperature without limiting the access of air, and then to cool much in the same manner. Then followed methods and apparatus to control the amount of air and the combustion of the fuel so as to limit the amount of oxidation. Along with this came the idea of special atmospheres or special gases to still further reduce oxidation and scaling. One result of this tendency has been the successful development of bright annealing.

Analogous to this is the designing of furnaces in which the rate and degree of cooling can be regulated, as described in a special article on other pages. In heat-treating operations it is often as important to regulate the cooling as to control the atmosphere, particularly as to the effect on the structure and consequently the physical properties. Thus we see that marked advances have been made in a very brief time in a knowledge of the proper way to carry steel through the various delicate stages of heating and cooling in order to quickly and economically bring out its best properties.

Merchandising, Rather Than Market Control, Is Way Out

Steel Founders' Head Sees No Substitute for "Sound Thinking, Accurate Estimating, and Good Salesmanship"

THE importance of merchandising, together with intelligent cost accounting, was emphasized by Arthur Simonson, vice-president, Falk Corp., Milwaukee, in an address at Pittsburgh Sept. 14 before the Steel Founders' Society of America, of which he is president.

"The society (Steel Founders' Society of America)," he declared, "can show us all the way to the most complete and accurate knowledge of cost that has ever been formulated for this industry. Then, on the basis of our own cost, intelligently estimated, let us price our product at a profitable figure and go out and sell it. Let us have the courage to quote a price and stick to it."

Efforts of industry artificially to stimulate a market and to influence the level of prices have been unsuccessful, he stated, as have similar attempts by governments to stimulate the market for basic commodities such as wheat, cotton, rubber and copper. "Where powerful governments have failed lamentably and miserably with all their power and prestige behind them, can we hope to succeed? Temporarily, partially, perhaps, but very temporarily and very partially, and, in most cases, the end result is worse instead of better."

Mr. Simonson said that he is in favor of the society's "actively sponsoring any activities that may honorably and legally be undertaken," and "steadfastly against any form of activity which does not meet these specifications. Such things as do not meet these requirements are foredoomed to failure, whether carried on by the society or any other agency. . . .

"There is no substitute for sound thinking, accurate estimating and good salesmanship up to the present time, and we shall have to depend upon our industry coming to its senses along those lines."

Warns of Silicosis Propaganda

The silicosis problem was discussed by Mr. Simonson in a separate report. He recounted how the society had induced a joint committee of the National Safety Council and the United States Department of Health to defer making a final report on the hazards of sandblasting until the foundry industry had an opportunity to study the subject and be heard on it. He referred to the possibility of legislation covering occupational diseases in the next few years and said that, if such legislation were based on a sound

foundation of fact, industry would welcome it, as it would define the burden to be borne and make it possible to provide for it by building up the proper reserves for carrying insurance. He cautioned against the danger of propaganda that would capitalize hazards of the foundry industry into a racket by unscrupulous physicians, lawyers and politicians.

Signs of Business Betterment

Representatives of 38 foundries attended the meeting. Members' individual reports were for the most part optimistic. Inquiries and orders were stated to be showing slight increases. Customers' stocks were said to be almost exhausted in some lines of business. A few foundries are marking all quotations "good for 30 days only," which has proved psychologically effective, and the trend was reported to

From Test Tubes and T-Squares

(Continued from Page 447)

Turbo-Compressors of Copper Bearing Metal

SEVERE conditions, particularly in connection with processing, demand the choice of materials which will afford extended life and usefulness. For this reason our company has recently adopted copper bearing metal as standard for the Spencer turbo-compressors. For cases where special chemical action is present we are, of course, furnishing non-corrosive alloy steels as required.

We believe that this improvement in the quality of material represents a step that will be in keeping with the spirit of the times in reducing maintenance costs for the users of our products.

—Spencer Turbine Co.
Hartford, Conn.

Improvements in Bolt and Forging Machinery

THE past two years have appealed to us as advantageous times in which to incorporate new engineering features in our products.

We have carried out this policy in all our lines, believing this to be to the interest of users of our equipment

be toward better prices for steel castings.

The board of directors authorized the preparation of a brief to be presented to a committee of the House of Representatives this fall to show why the Government should curtail or discontinue its steel foundries.

Plant Rehabilitation Urged

H. J. Koch, Fort Pitt Steel Casting Co., called attention to the nationwide effort to get industry in general to rehabilitate its plants, install modern machinery, etc., and a memorandum setting forth reasons justifying such activity was distributed at the meeting.

Frank D. Glosser, Commercial Steel Casting Co., Marion, Ohio, called attention to the R. F. C. stipulation that roads constructed with funds borrowed from that institution should be built with hand labor and not road building machinery. Members were asked to urge their representatives in Congress to vote for the elimination of this rule, which reduces employment in the plants building highway machinery.

L. W. Lyons, credit manager, Westinghouse Electric & Mfg. Co., addressed the meeting on the value of the increased use of trade acceptances in stimulating business.

who will appreciate greater quality and output combined with decreased maintenance.

One illustration of this is the cam actuated grip which we have incorporated in our cushioned drive forging machine, which, with other improvements has increased the range of the machine as well as its output and the quality of the work. Another illustration is our Acme tangent die head, micrometer adjustment of which may be made without stopping rotation of the head.

—Acme Machinery Co.
Cleveland

New Steel Company to Build Plant in Texas

The Midcontinent Iron & Steel Corp., Dallas, Tex., has been organized, with a capitalization of \$1,500,000, to manufacture steel products from local raw materials. The plan calls for the building of two open-hearth furnaces and a bar mill for rolling reinforcing bars, with other finishing capacity to be added later. Included among the directors of the new company are C. Alexander, formerly general manager for the Tata Iron & Steel Co. of India; D. R. Knapp and E. F. McCrossin, New York, consulting engineers; J. H. Brillhart, president, Fort Worth Structural Steel Co., Fort Worth, Tex., and R. O. Shaffer, vice-president, Texas Rail Joint Co., Fort Worth.

SUMMARY OF THE WEEK'S BUSINESS

Steel Gains Slow and Spotty But Confidence Holds

Improvement Barely Perceptible in Ingot Production, Which Is at
16 Per Cent—Scrap Firm—Pig Iron Sales Expanding

ALTHOUGH there is naturally disappointment in the steel industry that September business has fallen short of even moderate expectations, this is tempered somewhat by the widespread confidence, among consumers as well as producers of steel, that measurable improvement is merely delayed and will make itself felt during the fourth quarter.

This confidence, though unsupported by signs of important steel tonnage, other than the projects to be financed by the Reconstruction Finance Corporation, finds its principal basis in the virtually complete absence of steel stocks in the hands of manufacturing consumers, together with the belief that the country's minimum requirements cannot much longer be supplied by the present meager output.

Although the steel industry has more than ample capacity to take care of the country's maximum requirements, the point is now being stressed that much of the equipment cannot be quickly brought into service because of long idleness. A sudden increase in demand for steel might find many consumers waiting for shipments much beyond the brief time they have become accustomed to during the past few years. Steel companies are trying to convince consumers of this condition in order to bring about reasonable replenishment of stocks.

AS compared with the exceedingly poor month of August, steel sales thus far in September have gained, but the improvement is more impressive on a percentage basis than in tonnage. The increases have not, however, affected all products and are barely perceptible in steel ingot production, which is estimated for this week at 16 per cent of the country's capacity.

Wire products have made the best showing and are being produced in the Chicago district at 35 per cent of capacity. Tin plate rollings have been stepped up to an average of 35 per cent, largely to provide for the late tomato pack, and there have been better orders in some districts for sheets and bars. At Chicago, steel sales and contract specifications were the best in 11 weeks, but the comparison is with a period of the market's greatest dullness.

Pig iron sales have also expanded in the Chicago district and are holding up fairly well elsewhere. A New England melter has bought 5000 tons, some of it for delivery early next year. Pig iron contracting for the fourth quarter reflects the belief of foundry operators that their business will improve during the remainder of the year.

Some of the recent buoyancy of the scrap market has disappeared, but the undertone of prices is still

strong, and price changes, though less numerous, are entirely on the up side. Heavy melting steel has advanced at Pittsburgh to an average of \$9.75 a ton, delivered, bringing THE IRON AGE composite price for this grade to \$7.75, the highest figure since April and within 75c. a ton of the peak for this year, in January.

RAILROAD repair work constitutes the most important prospect of the steel industry for the immediate future, notwithstanding the slowness of the carriers to apply for equipment loans from the Reconstruction Finance Corporation. Independent surveys of railroad equipment have disclosed that mechanically the carriers are in as impoverished a condition as they are financially, but the full import of this will not be apparent until traffic has materially expanded. Meanwhile, the roads are proceeding slowly with equipment rehabilitation programs in view of the increased capital charges they entail.

The Reconstruction Finance Corporation estimates that fully 30,000 tons of steel will be required for 1285 box cars the Pennsylvania Railroad will build in its own shops, for which a loan of \$2,000,000 has been granted. The Central of New Jersey has asked for a \$500,000 car repair loan and the Chicago & Eastern Illinois has applied for \$100,000 for rails and track supplies. Construction of the Dotsero cut-off by the Denver & Rio Grande Western will require rails and track supplies and 950 tons of structural steel. This loan totals \$3,850,000.

The Chicago sanitary district has applied for \$36,450,000 for work which will include 25 to 30 sewage disposal plants. Several self-liquidating projects, including a \$75,000,000 bridge at San Francisco, a tunnel and bridge in New York, a bridge over Chesapeake Bay and one over the St. John's River in Florida, are now under consideration at Washington. Structural steel awards in the week were 11,300 tons, with new projects calling for 15,600 tons. Orders for reinforcing bars for road work have gained despite the lateness of the season.

Steel orders from the automobile industry have gained a little, Buick having given releases for 10,000 cars and Ford having taken small shipments. Ford has not resumed production in its own steel plant. Some fourth quarter steel contracts have been placed, but the industry is proceeding slowly toward work on new models.

THE IRON AGE composite prices for pig iron and finished steel are unchanged at \$13.64 a gross ton for the former and 1.965c. a lb. for the latter.

▲ ▲ ▲ A Comparison of Prices ▲ ▲ ▲

Market Prices at Date, and One Week, One Month and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron	Sept. 20, 1932	Sept. 13, 1932	Aug. 23, 1932	Sept. 22, 1931
<i>Per Gross Ton:</i>				
No. 2 fdy., Philadelphia.....	\$13.84	\$13.84	\$13.84	\$16.26
No. 2, Valley furnace.....	14.50	14.50	14.50	17.00
No. 2 Southern, Cin'ti.....	13.82	13.82	13.82	14.69
No. 2, Birmingham.....	11.00	11.00	11.00	12.00
No. 2 foundry, Chicago*.....	15.50	15.50	15.50	17.50
Basic, del'd eastern Pa.....	13.50	13.50	14.00	16.75
Basic, Valley furnace.....	13.50	13.50	13.50	15.50
Valley Bessemer, del'd P'gh..	16.89	16.89	16.89	18.76
Malleable, Chicago*.....	15.50	15.50	15.50	17.50
Malleable, Valley.....	14.50	14.50	14.50	17.00
L. S. charcoal, Chicago.....	23.17	23.17	23.17	25.04
Ferromanganese, seab'd car-lots	68.00	68.00	68.00	85.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Rails, Billets, etc.

<i>Per Gross Ton:</i>				
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	32.00	32.00	32.00	34.00
Rerolling billets, Pittsburgh..	26.00	26.00	26.00	29.00
Sheet bars, Pittsburgh.....	26.00	26.00	26.00	29.00
Slabs, Pittsburgh.....	26.00	26.00	26.00	29.00
Forging billets, Pittsburgh....	33.00	33.00	33.00	35.00
Wire rods, Pittsburgh.....	37.00	37.00	37.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb...	1.60	1.60	1.60	1.60

Finished Steel

<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.60	1.60	1.60	1.60
Bars, Chicago.....	1.70	1.70	1.70	1.70
Bars, Cleveland.....	1.65	1.65	1.65	1.65
Bars, New York.....	1.95	1.95	1.95	1.93
Tank plates, Pittsburgh.....	1.60	1.60	1.60	1.60
Tank plates, Chicago.....	1.70	1.70	1.70	1.70
Tank plates, New York.....	1.898	1.898	1.898	1.88
Structural shapes, Pittsburgh..	1.60	1.60	1.60	1.60
Structural shapes, Chicago....	1.70	1.70	1.70	1.70
Structural shapes, New York..	1.86775	1.86775	1.86775	1.85½
Cold-finished bars, P'gh.....	1.70	1.70	1.70	2.10
Hot-rolled strips, Pittsburgh..	1.45	1.45	1.45	1.55
Cold-rolled strips, P'gh.....	1.90	1.90	2.00	2.15

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel

<i>Per Lb. to Large Buyers:</i>	Sept. 20, 1932	Sept. 13, 1932	Aug. 23, 1932	Sept. 22, 1931
	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.10	2.10	2.10	2.40
Hot-rolled annealed sheets, No. 24, Chicago dist. mill..	2.20	2.20	2.20	2.50
Sheets, galv., No. 24, P'gh...	2.75	2.75	2.75	2.90
Sheets, galv., No. 24, Chicago dist. mill.....	2.85	2.85	2.85	3.00
Hot-rolled sheets, No. 10, P'gh	1.55	1.55	1.55	1.70
Hot-rolled sheets, No. 10, Chicago dist. mill.....	1.65	1.65	1.65	1.80
Wire nails, Pittsburgh.....	1.95	1.95	1.95	1.90
Wire nails, Chicago dist. mill.	2.00	2.00	2.00	1.95
Plain wire, Pittsburgh.....	2.20	2.20	2.20	2.20
Plain wire, Chicago dist. mill.	2.25	2.25	2.25	2.25
Barbed wire, galv., Pittsburgh	2.60	2.60	2.60	2.55
Barbed wire, galv., Chicago dist. mill.....	2.65	2.65	2.65	2.60
Tin plate, 100 lb. box, P'gh..	\$4.75	\$4.75	\$4.75	\$5.00

Old Material

<i>Per Gross Ton:</i>				
Heavy melting steel, P'gh....	\$9.75	\$9.50	\$8.75	\$10.75
Heavy melting steel, Phila...	7.25	7.25	6.50	8.50
Heavy melting steel, Ch'go...	6.25	6.25	5.75	8.25
Carwheels, Chicago.....	7.00	7.00	7.00	9.50
Carwheels, Philadelphia.....	10.00	9.50	8.50	12.00
No. 1 cast, Pittsburgh.....	10.00	10.00	9.50	10.50
No. 1 cast, Philadelphia.....	9.50	9.50	8.50	11.50
No. 1 cast, Ch'go (net ton)...	6.25	6.25	6.25	8.50
No. 1 RR. wrot., Phila.....	7.50	7.50	8.50	10.00
No. 1 RR. wrot., Ch'go (net)...	5.00	5.00	3.75	7.00

Coke, Connellsville

<i>Per Net Ton at Oven:</i>				
Furnace coke, prompt.....	\$2.00	\$2.00	\$2.00	\$2.40
Foundry coke, prompt.....	2.75	2.75	2.75	3.50

Metals

<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Lake copper, New York.....	6.37½	6.37½	5.50	7.37½
Electrolytic copper, refinery..	6.00	6.00	5.12½	6.75
Tin (Straits), New York.....	24.35	24.50	23.12½	23.37½
Zinc, East St. Louis.....	3.25	3.45	2.75	3.70
Zinc, New York.....	3.62	3.82	3.12	4.05
Lead, St. Louis.....	3.45	3.45	3.25	4.22½
Lead, New York.....	3.50	3.60	3.40	4.40
Antimony (Asiatic), N. Y....	5.62½	5.75	5.25	6.50

▲ ▲ ▲ The Iron Age Composite Prices ▲ ▲ ▲

Finished Steel

Sept. 20, 1932
One week ago
One month ago
One year ago

1.965c. a Lb.
1.965c.
1.976c.
2.014c.

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products make 85 per cent of the United States output.

	HIGH	LOW
1932	1.976c., June 28:	1.926c., Feb. 2
1931	2.037c., Jan. 13:	1.945c., Dec. 29
1930	2.273c., Jan. 7:	2.018c., Dec. 9
1929	2.317c., April 2:	2.273c., Oct. 29
1928	2.286c., Dec. 11:	2.217c., July 17
1927	2.402c., Jan. 4:	2.212c., Nov. 1

Pig Iron

\$13.64 a Gross Ton
13.64
13.64
15.42

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

HIGH	LOW
14.81, Jan. 5:	13.64, Aug. 16
15.90, Jan. 6:	14.79, Dec. 15
18.21, Jan. 7:	15.90, Dec. 16
18.71, May 14:	18.21, Dec. 17
18.59, Nov. 27:	17.04, July 24
19.71, Jan. 4:	17.54, Nov. 1

Steel Scrap

\$7.75 a Gross Ton
7.67
7.00
9.17

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

HIGH	LOW
\$8.50, Jan. 12:	\$6.42, July 5
11.33, Jan. 6:	8.50, Dec. 29
15.00, Feb. 18:	11.25, Dec. 9
17.58, Jan. 29:	14.08, Dec. 3
16.50, Dec. 31:	13.08, July 2
15.25, Jan. 11:	13.08, Nov. 22

Pittsburgh Mills Receive Slightly Larger Orders for Some Products

PITTSBURGH, Sept. 20.—Improved releases for sheets and tin plate, heavier inquiry for structural steel and reinforcing bars, the granting of a loan to the Pennsylvania Railroad which will enable it to proceed immediately with the construction of 1285 freight cars, and further gains in scrap prices are constructive factors in the local steel market. In spite of these things the past week has been rather quiet, and the aggregate volume of orders for finished steel products has been disappointing.

Sentiment is by no means as buoyant as it was earlier in the month, and the prospect for definite improvement in the steel industry has been postponed until October.

Scarcely any tonnage is coming from the automobile industry, although two of the large companies in that field have placed orders for their fourth quarter requirements. Otherwise, steel consumers are generally indifferent to their future needs. The fact that steel prices are not being changed for the last three months of the year has also tended to postpone buying except for immediate requirements.

The structural steel market is featured by Government inquiry, and projects offered by the most recent relief bill are coming into the market in good volume. State highway work is appearing in the best volume of the year, despite the lateness of the season, and orders for reinforcing bars thus far in September have exceeded those of the entire month of August.

The \$2,000,000 loan granted the Pennsylvania Railroad by the Reconstruction Finance Corporation to build 1285 cars in its own shops has led to immediate inquiry for approximately 19,000 tons of steel. It is the intention of the railroads to rush this work, in which Pittsburgh mills will unquestionably share.

Steel ingot production in the Pittsburgh district is barely holding its own at 14 per cent of capacity, and in the Valleys and northern Ohio a slight decline is indicated. In that district schedules last week did not hold up to original plans, and production this week will not average more than 13 per cent. In the Wheeling district, however, steel output has risen to about 30 per cent of capacity.

Tin plate schedules are higher in the industry as a whole, averaging well over 35 per cent of capacity.

▲ ▲ ▲
Structural steel inquiry heavier. Releases of sheets and tin plate gain moderately.

* * *

Reconstruction Finance Corporation lends \$2,000,000 to Pennsylvania Railroad for building freight cars.

* * *

Scrap prices continue to show strong undertone, with some advances.

▼ ▼ ▼

Sheet production is also slightly heavier, recent orders having been largely of a miscellaneous nature.

Finished steel prices are generally unchanged, with weakness confined to certain finishes of sheets and cold-rolled strip. With no change in fourth quarter prices, consumers are in no hurry to extend contracts, and mills are not hastening commitments.

Pig Iron

A few inquiries have appeared in the district in the last week or two, but most of them involve small tonnages. A maker of railroad equipment has ordered 200 tons of iron, while two or three other inquiries for 100 tons or more are before the trade. Carlot orders are more numerous, and total sales of nearly all producers are running ahead of those of August. Prices seem to be holding on current transactions. One of the Shenango furnaces in the Valleys started production on Sept. 19, and the Neville stack of the Davison Coke & Iron Co. is still operating.

Semi-Finished Steel

The price of billets, slabs and sheet bars is well maintained at \$26, Pittsburgh or Youngstown.

Rails and Track Accessories

Releases are slow to come out, but the local rail mill may be able to resume production during October. New buying by the carriers is also expected next month. Some of them are beginning to plan their forward requirements.

Bars, Plates and Shapes

Structural inquiry reaching local fabricators has been higher in the last week, and awards to one large interest were the heaviest in some time. State and Government work predom-

inates, although some private projects are coming out. Demand for reinforcing bars has also been heavier during September, largely because of substantial highway lettings in Pennsylvania and West Virginia. Merchant bars are comparatively quiet, but a rather steady increase in demand is reported over the last two weeks. Plates continue rather dull. Barge work is still in the formative stage, and no railroad inquiry has come into the market except that of the Reading, which was closed recently.

Prices are well maintained at 1.60c., Pittsburgh, and are being generally extended into the fourth quarter.

Cold-Finished Steel Bars

Limited improvement in demand is noticed by some makers, but tonnage is still too light to have any appreciable effect on production. The price structure is well maintained at 1.70c., base, Pittsburgh, with differentials applying to buyers of 20,000 lb. or over, and extras on smaller lots.

Tubular Goods

Movement of pipe has shown no change this month and continues very dull on all types of material. The oil industry is taking considerably less tubular products than it was in the summer, and can hardly be expected to boost its requirements during the fall. Standard pipe may reflect seasonal gains a little later, but recent building projects have not been of the type which takes large quantities of this material. Movement of boiler tubes is fairly well maintained.

Wire Products

The month to date has made a somewhat better showing than August in aggregate demand, but seasonal pick-up is slow to materialize. Movement of fencing and barbed wire is a trifle heavier, but manufacturers' wire continues very quiet. Demand for road mesh has benefited from heavier State highway work in the last few weeks. Prices are well maintained.

Sheets

Releases were heavier with some companies last week, although those who depend on the automobile industry for their business are able to report little improvement. Small miscellaneous users, particularly jobbers, are accounting for the majority of current tonnage. In some cases consumers who have taken no tonnage for several months are again appearing in the market, and, even though their

requirements are small, totals are fairly satisfactory. Production last week averaged about 17 per cent of capacity, and may show another rise this week.

Quotations are holding on most finishes in the principal districts, but there are still some weak spots. In some cases low-priced contracts have been extended into October, but on current spot business the general structure is well maintained. Buying by one or two large automobile makers in the last week has clarified the price structure on auto body sheets, which are now generally quoted at 2.75c., Pittsburgh.

Tin Plate

Orders from the can makers to take care of the late tomato crop brought some improvement in current business last week, and mill schedules have risen to at least 35 per cent of capacity. This is contrary to the seasonal trend, but does not seem to represent work on anticipated tonnage for next year.

Strip Steel

The strip steel industry is still awaiting improvement in automobile orders. Some producers are receiving a little more tonnage than they took during August, but the gains have not been large enough to indicate a trend. Mill schedules are still intermittent, but most makers run for a short time every second or third week. It is difficult to figure aggregate production under such circumstances, but the average is not over 10 per cent of capacity. Prices on hot-rolled strip are fairly well maintained, but cold-rolled is rather weak.

Coke and Coal

Improved operations in the merchant furnace trade since the first of the month has increased consumption of furnace coke. Foundry grades are also moving at a better rate than in August. Domestic business is not yet developing, as dealers are not anxious to stock in anticipation of demand.

Scrap

Mill purchases at \$9.75 and \$10 during the week have further strengthened the market on No. 1 heavy melting steel, which is clearly quotable at \$9.50 to \$10. Dealers are having difficulty in covering old orders at lower prices, as the supply of scrap in the district has not increased. The recent \$10 order called for at least 5000 tons, and an even larger tonnage was placed at \$9.75. The other grades are largely unchanged, although specialties are stronger in sympathy with No. 1 steel. The blast furnace grades are still quotable at \$6 to \$6.50, although some dealers are paying more to cover an old order at a higher price. The price of No. 1 heavy melting steel was erroneously quoted in last week's issue at \$9 to \$10.50, whereas it should have been \$9 to \$10.

Buffalo Furnaces Share 5000-Ton Pig Iron Order

BUFFALO, Sept. 20.—The Draper Corp., Hopedale, Mass., has purchased 5000 tons of foundry, some of which is understood to have been placed with Buffalo furnaces. Foundry melt in Connecticut, Massachusetts and New Jersey has definitely improved. It is understood that one of the largest pig iron buyers in the country has been negotiating for some time and will close within a week or so on a considerable quantity of iron. More inquiries are coming in for first quarter delivery, but no quotations are being made.

Steel

The Lackawanna plant of Bethlehem Steel is operating three open-hearth; Republic Steel is operating three open-hearths on a slightly shorter week than usual, charging one day later. Wickwire Spencer has one open-hearth active.

Scrap

A Buffalo mill has bought 5000 tons of selected No. 2 heavy melting steel for shipment from New York by barge at \$6.50 a ton, delivered. A tonnage of borings and turnings was sold at a price reported to be \$4.75. Stove plate has been sold at slightly more than the last quoted price. It is very scarce and it is believed that no tonnage can be purchased at less than \$8. No. 1 machinery cast is also scarce and in good demand. Dealers are active in endeavoring to replenish stocks. Some material is being shipped out of Buffalo, No. 1 hydraulic compressed sheets, having sold on a basis of \$6.25, Buffalo, for outside delivery.

Canadian Trade Shows Signs of Improvement

TORONTO, Sept. 20.—Indications of improvement in the Canadian iron and steel industry are appearing. During the week Algoma Steel Corp., Sault Ste. Marie, Ont., resumed operations in several departments. The 18-in. merchant mill and two open-hearth furnaces were started early in the week and were followed by the 12-in. merchant mill on Friday.

Other branches of the industry are showing better indications and are expected to be reflected in increased activity in operations. The automotive industry is said to be placing contracts for steel, castings and parts for the 1933 cars.

Pig Iron

New business is gradually developing in better volume in this market, but melters continue to buy on a

hand-to-mouth basis. While melters are running on low stocks, they are not interested in placing future delivery contracts. Prices remain firm and unchanged.

Scrap

New developments are absent from this market. Dealers report a specialized demand, with only a few lines moving. Steel grades continue stagnant with no demand from the mills and shipments negligible. The National Iron Works, Toronto, however, is taking in supplies and has built up a considerable pile of scrap in its yards. Current demand runs mostly to machinery cast, which has a steady call from foundries. Supplies are scarce and dealers are importing this grade from the United States.

Birmingham Pig Iron Demand Still Poor

BIRMINGHAM, Sept. 20.—Sales and shipments of pig iron continue mediocre, with no improvement over the preceding weeks of the month. However, new tonnage and shipments for this month are ahead of those for July and August.

Cast iron pipe orders of any size are infrequent, and operations are accordingly curtailed. Schedules are variable, usually two or three days a week, with seldom a full week's steady operation.

The Woodward Iron Co. blew in its No. 3 furnace on foundry iron on Sept. 15, and for the time being is operating two. Its No. 2 furnace, however, will soon go out. The Tennessee company is still operating the No. 6 furnace at Fairfield on basic. The additional Woodward stack gives Alabama three active furnaces. Another producer may blow in a furnace within the next 30 days, depending upon the market conditions.

The quotation of \$11 for the Southern market is quite firm.

Steel

Steel tonnage continues at about the level of the past few weeks, the fair volume from seasonal demand holding up. One manufacturer reported last week as slightly better in all lines than the preceding week. Sheets are leading other products in demand. A slightly better week is reported by fabricators. The Virginia Bridge & Iron Co. booked 275 tons for a bridge.

Seven open-hearths were in operation last week. The Tennessee company operated three at Fairfield and Gulf States Steel four at Alabama City. No change in this schedule is anticipated for the current week.

Scrap

The market is dull. Prices are unchanged.

Chicago Pig Iron Demand Expands; Steel Sales Best in Weeks

CHICAGO, Sept. 20.—The general picture of the finished steel market is changing very slowly, but pig iron trade is showing noticeable improvement.

Both sales and specifications for steel mill products are the best in 11 weeks, but the margin of gain is small and can barely be detected in the rate of ingot output. Demand for wire products continues to grow and more sheets are moving. However, support from the railroads is almost wholly lacking.

Contractors' machinery manufacturers report heavier operations and new tractor models are attracting the attention of buyers. One farm machinery builder is operating on a very satisfactory schedule, but others have not yet passed beyond the stage of preliminary preparations for production. Jobbers report a moderate, but rather steady, growth in shipments.

Heavy tonnage grades of scrap are listless in the absence of mill demand. Some specialties, however, continue to move at firm prices. Pig iron shipments are showing steady gains and interest in new buying is expanding.

Pig Iron

Shipments of Northern iron show rather marked improvement, the rate for September being not less than 35 per cent heavier than in August. New buying is keeping pace, as is evidenced by purchases in the first 10 days of September being equal to the total for last month. One merchant stack is blowing and one is banked. The flow of Southern iron into this territory has practically ceased.

Bolts, Nuts and Rivets

Forward contracting is making steady progress and little opposition to prices is encountered. Releases remain spotty and, on the whole, are not materially larger than earlier in the month.

Reinforcing Bars

Jobbers have started to order steel for recent Illinois road lettings. About 200 tons have been placed and fully 1800 tons, part of which may be carried over to next year, is still to be ordered. Bars for several World's Fair buildings are soon to be purchased, and 1800 tons of steel bars will soon be let for bridges near Springfield, Ill. The recent drop in prices for rail steel bars for road work is still in effect and is tending

Pig iron shipments in September 35 per cent larger than those of August.

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New orders and specifications for steel the best in 11 weeks.

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Scrap market has lost buoyancy, but prices are still strong.

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to shake the whole reinforcing bar price structure. Private lettings and inquiries are again turning very dull.

Wire Products

The upward turn in demand, noted a number of weeks ago, is still in evidence, with the prospect now that September shipments will run more than 30 per cent ahead of those of July, which was the low month. This situation is affecting output, which has been raised to 35 per cent of capacity. It is rather significant that increased shipments should come at a time when automotive demand is at low ebb. Paving programs remain active and the movement of mesh for reinforcement is in good volume. Strength in prices for copper has had little effect on copper wire sales, principally because of inactivity on the part of public utilities. Here and there some price disturbance occurs, though on the whole quotations are more stable than earlier in the month.

Rails and Track Supplies

There is still an absence of news concerning probable rail programs. The Denver & Rio Grande Western has obtained Federal funds to construct the Dotsero cut-off, which, by the use of the Moffat tunnel in Colorado, will shorten the distance between Denver and Salt Lake City. It is probable that the rails needed will come from the Colorado mill. The Chicago & Eastern Illinois is seeking Government funds for track work which will involve 1100 tons of rails. Light rails are moving in small lots.

Cast Iron Pipe

Outstanding among recent inquiries is one for 2000 tons for a filtration plant at Springfield, Ill. A round tonnage will also be needed by Kenosha, Wis., for a sewage plant. It now seems unlikely that Wilmette, Ill., will get Government aid for its water plant.

Plates

Current tank business is limited to a few scattered orders. Railroad car repair work remains small in the Central West. Large pipe is in light demand, but both jobbers and mills find a very encouraging increase in use of merchant pipe.

Structural Material

New structural awards and fresh inquiries are lighter. State highway bridge work still forms the backbone of the market. Inquiries from the railroads have failed to expand, and private work of more than the most meager proportions is absent. The bridge at Ottawa, Ill., requiring 1800 tons, will be up for bids again Oct. 4.

Bars

Miscellaneous demand for bars is making headway, but the pace is slow. Willys-Overland, Toledo, is to build ½-ton trucks to be marketed through and under the name of the International Harvester Co. Reports from Milwaukee show that contractors' equipment manufacturers are busier, and a tractor builder now offering a new model has not caught up with orders. Shipments of rail steel bars have reached the highest point since last spring.

Sheets

Demand is still spotty. Little tonnage for fourth quarter is on mill books. However, the aggregate tonnage being shipped shows some improvement over the volume at the beginning of the month. Most sellers here are quoting 2.30c. a lb., Chicago mills, for No. 24 hot-rolled annealed.

Scrap

Sentiment among scrap dealers is somewhat dampened for the reason that demand from steel mills has not broadened as had been expected. At the same time supplies of most grades are such that prices continue to work toward the stronger side. Small lots of heavy melting steel have been taken at \$6, while the Chicago & Alton has sold heavy melting steel at \$7 a gross ton, delivered. The Milwaukee Road offered a long list and then withdrew it. Negotiations are again under way for the shipment of scrap from Chicago by boat. Inquiries are out and tonnage may move to Buffalo and to Canada. Steel foundries are keeping in the market. They are bidding for some grades direct to the railroads.

Eastern Pennsylvania Steel Production Slightly Improved

Rate Up to 15 Per Cent—Business Gaining More Slowly Than Was Expected—Pennsylvania Railroad Gets Loan

PHILADELPHIA, Sept. 20.—Slow action on railroad buying programs and uncertainty over the political situation are assigned as the principal reasons for a let-down in sentiment in the iron and steel trade. Orders coming to mills, while small, show no decline, but on the other hand disappointment is felt because there has been no marked upturn, which had been rather confidently believed to be near by reason of the recent improved sentiment and demands usually evident at this season of the year.

Steel works operations in this district, however, have risen two points to 15 per cent of capacity. One of the Eastern plants of a large maker has added two open-hearth furnaces, together with a blooming mill, to begin rolling on accumulated orders. An early upswing or decline in operations depends upon whether new business develops soon. The rate of operations therefore is one of quick shifts.

Pig Iron

Miscellaneous orders from melters of pig iron have shown a mild improvement. They call for carloads chiefly and are for foundry and malleable grades. Demand for steel-making iron is absent. Prices for domestic tonnage are unchanged, but again begin to show the influence of further low quotations on foreign iron.

Plates, Shapes and Bars

The Reading Railroad now is considering the purchase of fabricated plates for use in its car repair program. It is thought that orders for the remaining tonnage will be distributed the latter part of the week. These will involve about 3000 tons of car plates and plates for the repair of 78 locomotives. The only requirements so far placed by this carrier are 600 tons of car plates and those for rivets. The Reconstruction Finance Corporation has approved the Pennsylvania Railroad's application for a loan of \$2,000,000 for the building of 1285 steel box cars. While the market is reported to be fairly firm, shading of 1.70c., Coatesville, on plates has occurred. The American Steel Engineering Co. was awarded 650 tons of reinforcing bars for the Girls' High School in Philadelphia, while 460 tons of structural material for the same job went to the Lehigh Structural Steel Co.

Sheets

Some makers report a moderate increase in orders. It is due partially

to business from tank and refrigerator manufacturers. Orders from the automotive industry are negligible. Body builders in this district are operating at an extremely low rate. It is expected, however, that they will receive sizable contracts within three or four weeks and be able to increase operations substantially. Prices generally are holding well, though weakness still is reflected in certain grades, especially galvanized sheets. Reports are heard of shading of this grade \$2 a ton to 2.75c., Pittsburgh. The Philadelphia post office will require

St. Louis Stove Plants Increasing Activity

ST. LOUIS, Sept. 20.—Activities in the stove plants in the St. Louis industrial district are increasing, following the receipt of orders from the large mail order houses, but other lines continue quiet. The St. Louis Gas & Coke Corp. sold about 1000 tons during the week in miscellaneous lots, buyers being almost entirely stove interests. Prices are unchanged.

Steel

Open-hearth operations in the St. Louis industrial district are at about 15 per cent of capacity. Railroads centering here have issued inquiries for fourth quarter requirements for plates, shapes, bars and sheets; third quarter specifications were extremely light. The seasonal movement of sheets for agricultural interests has been small. The Ann Arbor Railroad, a subsidiary of the Wabash, bought 150 tons of steel sheet piling from the Kalman Steel Corp. for use at Frankfort, Mich. The Superior Structural Steel Co. has been awarded 200 tons of structural steel and the Truscon Steel Co. 100 tons of reinforcing bars for a municipal negro hospital, and the St. Louis Structural Steel Co. has been awarded 168 tons for pontoons for the Government at Memphis. The 1800 tons of reinforcing bars for the St. Louis municipal auditorium has gone to the Laclede Steel Co. and the Missouri Rolling Mills Corp., the allocation yet to be determined. The United States Engineers' office in St. Louis will open bids Sept. 26 on 650 tons of pontoons and trucks and 4720 ft. of 20-in. discharge pipe.

Scrap

After having been out of the market for months, a district mill bought a considerable tonnage of such items

about 800 tons of galvanized sheets, and it is expected the contract for this tonnage will be placed within a week or 10 days.

Imports

Imports at Philadelphia last week consisted of 5891 tons of pig iron from the Netherlands.

Scrap

While several grades of scrap have moved up 50c. a ton, the market reflects a slightly softer tone due to the fact that two steel companies have suspended shipments on No. 2 steel. The strength of the market in other districts is, however, a factor in holding it up in eastern Pennsylvania. A fair-sized lot of stove plate was sold the past week at a reported price of \$7, delivered, while sales of couplers and knuckles, rolled steel wheels and cast iron carwheels have resulted in advances on these grades.

as rails, bolsters, couplers and knuckles and other specialties. Dealers were careful not to sell any of these items short. The Louisville & Nashville list of 28,500 tons offered last week was withdrawn on account of unsatisfactory prices. The only new list is that of the Chicago, Burlington & Quincy, 3100 tons. Cast iron carwheels are 50c. a ton higher. The market is strong.

Cincinnati Scrap Higher; Forward Pig Iron Buying

CINCINNATI, Sept. 20.—An apparent desire of pig iron consumers to cover for some of their future requirements at present prices was manifest the past week in this district for the first time this year. Two southern Ohio melters placed orders for 300 and 500 tons of Northern iron for future delivery. Other business was in small lots, but the total was in excess of 1000 tons. Foundry operations have not changed, but in some quarters melters indicate a desire to cover in preparation for anticipated improvement during the fourth quarter.

Steel

Moderate improvement in automotive specifications for sheets the past week brought demand above the level of the preceding week. Production this week has been increased to care for the gain in orders.

Scrap

Despite increases in dealers' bids, an adequate supply of scrap is lacking. The situation is further complicated by the withdrawal of the Louisville & Nashville list. Some mills indicate a desire to make purchases, but absence of material has made dealers wary of selling without some prospect of being able to cover.

Cleveland Steel Orders Show Further Moderate Increase

Gain Largely in Bars, Both in Jobber and Consumer Trade—
Ingot Output Unchanged

CLEVELAND, Sept. 20.—Demand for finished steel shows a further slight increase. The gain so far this month over August is large when figured on a percentage basis, but not impressive in tonnage.

Steel ingot output in Cleveland is unchanged at 23 per cent of capacity.

The improvement the past week was largely in steel bars. The size of orders has increased to the extent that carlot business is considerably more plentiful than for some time. Demand is well distributed among miscellaneous consumers and some tonnage has come from jobbers. Previously reported improvement in the demand from the oil industry is being maintained. Railroads are still a minor factor in the demand for steel, as they have no definite inquiries out for material for repair work. However, some small orders came from this source during the week for routine fourth quarter requirements.

There has been a slight spurt in the demand for sheets and strip steel from the automotive industry, Ford and some of the other motor car companies placing small lots for immediate requirements. Automobile manufacturers are still figuring with producers for steel for the fourth quarter. However, they are showing no haste in getting under production on new models.

While no formal announcement of fourth quarter prices on bars, plates and shapes has been made, the present prices are being continued and a few orders for the quarter have been taken at these prices. Irregularity still exists in sheet prices although the market has a firmer tone.

Pig Iron

While sales and inquiry declined the past week, Cleveland interests sold 5000 tons in foundry and malleable iron, all in small lots. Little inquiry is now pending. Business with some jobbing foundries shows a slight upturn. Although shipments in September will be considerably larger than in August, the increase probably will not be up to recent expectations because a looked-for gain in the demand from motor car foundries has not materialized. Prices are well maintained.

Iron Ore

With shipments sharply restricted, the amount of ore at furnaces and Lake Erie docks Sept. 1 was nearly 3,000,000 tons less than on the same date last year. The amount was 32,-

163,651 tons, against 35,071,201 tons on Sept. 1, 1931. Ore consumption in August declined 37,771 tons from July, the amount used having been 606,961 tons. In August last year 1,652,247 tons was consumed. Furnace stocks Sept. 1 amounted to 26,895,962 tons. Central district furnaces in August used 287,406 tons, a decrease of 9174 tons. Lake front furnaces consumed 288,515 tons, a decrease of 27,278 tons, and Eastern furnaces melted 4279 tons, a decrease of 1364 tons. All-rail furnaces used 26,761 tons, an increase of 45 tons. There were 41 furnaces in blast Aug. 31 using Lake ore, a decrease of three for the month.

Sheets

Business with a few mills gained during the week as a result of the placing of moderate orders for early shipment by several of the automobile manufacturers. Miscellaneous orders show a slight gain. While the business is still coming in small lots,

consumers are making slightly larger purchases than recently. The market is firmer to the extent that some producers are adhering to 2.20c., Pittsburgh, for black sheets and 2.85c. for galvanized.

Strip Steel

Demand is spotty. While some new business in both hot and cold-rolled strip was placed during the week by motor car manufacturers, there was no further new demand from makers of automobile accessories whose activity stimulated the market during the previous week. Hot-rolled strip is firm at 1.45c. to 1.50c., Pittsburgh. Cold-rolled material ranges from 1.90c. to 2c., Cleveland.

Bars, Plates and Shapes

With little new inquiry for fabricated work, demand for structural material is light. Plate orders show a moderate gain. Some of the boiler shops are busier. One Ohio fabricator has taken an Eastern tank job requiring 245 tons. Prices are firm.

Scrap

Activity is confined to purchases by dealers for shipment to the Valley district. However, dealers have pretty well covered against their recent orders and the market has quieted down somewhat. Prices show no further upward tendency.

European Steel Markets Gaining Strength

LONDON, ENGLAND, Sept. 19 (By Cable).—Pig iron is quiet, but confidence is gaining ground and more furnaces have been started up. Heavy steel demand is very quiet. Export sales are hindered by exchange and other financial difficulties. Steel plants are working intermittently.

Tin plate is strong on good home and export demand and mills are now well booked for several weeks. Home consumers bought for delivery into the spring. Overseas demand has come from Europe, Australia, India and South America. Second hands are bidding strongly for tin plate to cover short sales and early shipment.

Continental steel is firm on increased overseas buying, especially by China and South America. Continental producers are very hopeful and confidence is believed to be slowly reviving.

British demand for foreign steel is quiet.

The Alpine Montangesellschaft is erecting a new plate mill at Donawitz.

Russia has placed further orders for 20,000 tons of German steel. Russian output in August was 502,000 tons of pig iron and 417,000 tons of Martin steel.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton			
Ferromanganese, export	£9 0s.		
Billets, open-hearth	£4 17s.	6d. to	£5 7s. 6d.
Black sheets, Japanese specifications	£9 12s.	6d.	
Tin plate, per base box	15s.	9d. to	16s. 3d.
Steel bars, open-hearth	£7 17½s.	to	£8 7½s.
Beams, open-hearth	£7 7½s.	to	£7 17½s.
Channels, open-hearth	£7 12½s.	to	£8 2½s.
Angles, open-hearth	£7 7½s.	to	£7 17½s.
Black sheets, No. 24 gage	£8 0s.	to	£8 10s.
Galvanized sheets, No. 24 gage	£9 10s.		

Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £ at \$4.86			
Billets, Thomas ..	£1 18s.	6d.	
Wire rods, No. 5 B.W.G.	£4 10s.		
Black sheets, No. 31 gage, Japanese	£11 5s.		
Steel bars, merchant	£2 8s.		
Beams, Thomas ..	£2 3s.		
Angles, Thomas, 4-in. and larger ..	£2 7s.	6d.	
Angles, small	£2 9s.	6d.	
Hoops and strip steel over 6-in. base	£3 0s.	to	£3 2s. 6d.
Wire, plain, No. 8 ..	£5 5s.		
Wire nails	£5 7s.	6d.	
Wire, barbed, 4-pt. No. 10 B.W.G. ..	£8 15s.		

New York Pig Iron Sales Larger; Steel Trade Slightly Better

Improvement in Steel Is Barely Perceptible, But Pig Iron Business Includes One 5000-Ton Order

NEW YORK, Sept. 20.—Steel sales in the New York district have gained moderately thus far in September. On a percentage basis some of the gains are impressive, because they are compared with the unusually poor business of August, but they are not very important as to tonnage.

Although there is disappointment that September has not shown up better, there also is a degree of satisfaction that the trend is in the right direction. Gains are more noticeable in the light products—sheets and wire products in particular—than in plates, shapes and bars. There is virtually no business in sight for rails, though one large Eastern road may come into the market soon for about a third of its normal annual requirements.

Railroads admit their need of car and locomotive repairs and in some cases of new equipment and rails, but they are moving slowly to take advantage of R. F. C. loans because of the carrying charges involved in additional capital investments. However, any marked increase in traffic would force many of them into the market because much of their equipment is in worse shape than is generally admitted.

Expansion of structural steel demand is generally dependent on loans by the Reconstruction Finance Corporation. Two large New York projects—the Tri-borough bridge and the Thirty-eighth Street tunnel—may be approved soon.

Sheet makers are adopting a firmer price policy with a view to fourth quarter business, but on current orders some of the recent concessions have not disappeared. The indications are that this weakness may be cleared up by the end of the month, when the higher quotations go into effect. Plate prices continue to be subject to concessions of at least \$2 a ton on sizeable orders, which, however, are scarce.

Pig Iron

Further expansion in demand is evidenced by last week's bookings of 6000 tons, which compare with 3000 tons in the preceding week and 6000 tons two weeks ago. Not included in this total is a 5000-ton purchase of No. 2X and No. 1X foundry iron for delivery into next year to the Draper Corp., Hopedale, Mass. Though the swelling volume of sales cannot be attributed directly to a proportionate increase in foundry melt, the fact that

new contracts generally specify extended delivery at least augurs definite expectations of tangible improvement in foundry operations during the coming quarter. Current specific inquiry is light, but general buying interest is brisk. Although furnace base prices for normal lots are nominally unchanged, pressure of foreign competition on sizable tonnages has forced sharp concessions from prevailing schedules on domestic iron. Despite the lower offerings on foreign metal, however, domestic furnaces have taken a greater part of recent bookings. A cargo of 5891 tons of Royal Dutch iron arrived at Philadelphia last week for delivery against standing orders.

Scrap

Sale of 5000 tons of selected No. 2 heavy melting steel for barge shipment from New York to a Buffalo mill at \$6.50 a ton, delivered, represented the only important transaction during a rather dull week. Two eastern Pennsylvania mills have suspended shipments against contracts, and deliveries to other consumers are sporadic. Prices are firm and unchanged.

Pacific Coast Trade Is Encouraged by Inquiries

SAN FRANCISCO, Sept. 19.—A tendency toward an increasing volume of inquiries and the maturing of Federal projects at a larger rate have continued to support the encouraged spirit of the Pacific Coast market. August reports disclosed one of the year's lightest months in tonnage. The Los Angeles, Seattle and Portland areas have been especially light, and the San Francisco market slightly more active.

Indications that fruit and vegetable canning would require additional tin plate have failed to materialize.

Except for slight weakness in sheets, all quotations are firm.

Favorable action by the Reconstruction Finance Corporation on the application of the Los Angeles metropolitan water district for a \$40,000,000 loan means an eventual purchase of 25,000 tons of steel for the pipe line from the Colorado River to the Los Angeles area. The district expects to be employing 1000 men by the end of the year.

Reported awards of shapes and reinforcing bars for the week total 1400 tons, with over 1500 tons in new inquiries.

About 100 tons of plates will be required for 740,000-gal. steel oil tank for the naval fuel depot at Sangley Point, Cavite, P. I. Bids will be opened by the Bureau of Supplies and Accounts on Oct. 11.

New England Melter Buys 5000 Tons of Pig Iron

BOSTON, Sept. 19.—The Draper Corp., Hopedale, Mass., has bought 5000 tons of pig iron for delivery into next year. Pending business embraces small lots only.

Scrap

Higher prices for scrap in other markets are still not reflected here. Demand for old material in general is limited to an occasional carlot, but as owners will not make price concessions the undertone of the market is very firm. The American Steel & Wire Co., Worcester, Mass., is still paying \$5 a ton, delivered, for No. 1 heavy melting steel, but its contracting is small. Foundry consumption of textile and No. 1 machinery cast is fair, but spotty.

Detroit Scrap Market Is Less Buoyant

DETROIT, Sept. 20.—In the face of a reduction of industrial operations in this district to a new low point for the depression and the failure of steel mill production to gain, the local scrap market is less buoyant. The speculative buying which carried prices upward in the last few weeks has at least temporarily run its course, but quotations are holding at the levels reached a week ago. Consumer purchases are practically at a standstill.

Pipe Lines

Consumers Power Co., Jackson, Mich., is planning natural gas pipe lines for service in Broomfield, Union and Chippewa townships, connecting with main trunk line to Zilwaukee.

Ashland Refining Co., Ashland, Ky., is planning 4-in. oil pipe line across Big Sandy River.

Pasadena, Cal., let contract to Western Pipe & Steel Co., Los Angeles, for welded steel pipe for service at Pine Canyon Dam, at \$13,471.

United States Engineer's Office, St. Louis, will open bids Sept. 26 on 2340 ft. of 20 x 1/2 in. and 2380 ft. of 20 x 3/4 in. discharge pipe.

Shipments of electric industrial trucks and tractors in August totaled 19 units, the same as in July, according to reports received by the Bureau of the Census from 10 leading manufacturers.

Fabricated Structural Steel

Lettings Again Decline—New Projects Gain

BRIDGES, schools and post office buildings, which will require 8400 tons, account for the bulk of awards totaling 11,300 tons. A bridge over the Canadian River at Bridgeport, Okla., will take 2100 tons, the largest booking reported. New projects of 15,600 tons are slightly in excess of those a week ago calling for 12,300 tons. The only sizable inquiry is 3600 tons for two housing projects in the Bronx, New York. Awards follow:

NORTH ATLANTIC STATES

Orono, Me., 300 tons, University of Maine unit, to Boston Bridge Works, Inc.
Brockton, Mass., 145 tons, post office, to unnamed fabricator.
State of Connecticut, 145 tons, East Hampton-Colchester bridge, to American Bridge Co.
Middletown, Conn., 120 tons, highway bridge, to American Bridge Co.
Bridgeport, Conn., 400 tons, post office, to Lehigh Structural Steel Co.
New York, New Haven & Hartford Railroad, 400 tons, bridge at Modena, N. Y., to American Bridge Co.
Washington, N. Y., 115 tons, school, to Shippers Car Line Corp.
Philadelphia, 460 tons, Girls' High School, to Lehigh Structural Steel Co.

SOUTH AND SOUTHWEST

State of West Virginia, 150 tons, highway bridge, to McClintic-Marshall Corp.
State of Kentucky, 445 tons, highway bridges in Spencer and Perry counties, to Pittsburgh-Des Moines Steel Co.
State of Alabama, 275 tons, Warrior River bridge, to Virginia Bridge & Iron Co.
Bridgeport, Okla., 2100 tons, bridge over Canadian River, to American Bridge Co.
Baton Rouge, La., 340 tons, post office, to Wheeling Structural Steel Co.

CENTRAL STATES

Frankfort, Mich., 150 tons, steel sheet piling, for Ann Arbor Railroad, to Kalman Steel Corp.
Chicago, 220 tons, Ogden Avenue bridge operator's house, to Reuter Brothers.
Halsted, Minn., 206 tons, highway bridge, to Illinois Steel Bridge Co.
Marathon County, Wis., 100 tons, highway bridge, to Wisconsin Bridge & Iron Co.
Chicago & North Western Railway, 600 tons, bridge and separation work, to American Bridge Co.
Milwaukee, 180 tons, Watertown Plank Road overhead, to Milwaukee Bridge Co.
Mandan, N. D., 125 tons, highway bridge, to Clinton Bridge Co.
Chicago, 1500 tons, refinery improvements for Consolidated Oil Corp., to an unnamed fabricator.
State of Illinois, 120 tons, highway bridge in Schuyler County, to Clinton Bridge Co.
State of North Dakota, 200 tons, highway bridge, to Illinois Steel Bridge Co.
State of Missouri, 155 tons, bridge, to McClintic-Marshall Corp.; previously reported to Mississippi Valley Structural Steel Co.
St. Louis, 200 tons, negro municipal hospital, to Superior Structural Steel Co.

WESTERN STATES

Cyr, Mont., 300 tons, highway bridge over Missoula River, to Minneapolis-Moline Power Implement Co.
Hoover Dam, 1000 tons, building for Babcock & Wilcox Co., to Colorado Fuel & Iron Co.
State of Washington, 138 tons, Deep River swing span, to Washington Iron Works.
San Rafael, Cal., 950 tons, building for Hamilton Field Army Bombing Base, to McClintic-Marshall Corp.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Binghamton, N. Y., 650 tons, post office; bids Oct. 17.

Binghamton, N. Y., 500 tons, armory; bids Sept. 30.
Portland, Me., 700 tons, post office.
New York, 3600 tons, two housing projects in the Bronx.
Malverne, N. Y., 500 tons, high school.
Newark, N. J., 800 tons, residential housing project.

SOUTH AND SOUTHWEST

State of Nebraska, 1300 tons, highway bridges.
Waco, Tex., 800 tons, highway bridge over Bravos River.
State of New Mexico, 100 tons, highway bridge.
State of Oklahoma, 640 tons, highway bridge.

CENTRAL STATES

Cincinnati, 4500 tons, post office; Consolidated Engineering Co., Baltimore, low bidder on general contract.
Joliet, Ill., 1000 tons, McDonough Street bridge; Independent Bridge Co., low bidder.
State of Ohio, 350 tons, bridge over Great Miami River.
State of Wisconsin, 1000 tons, Buffalo and Pepin County bridges, No. 2, Worden-Allen Co., low bidder; 600 tons, Nos. 3, 4 and 5, Industrial Contracting Co., Minneapolis, low bidder; 600 tons, Nos. 6, 7 and 8, American Bridge Co., low bidder; 100 tons, No. 1, Minneapolis Bridge Co., low bidder.
State of Wisconsin, 100 tons, Weyauwega bridge; bids close Sept. 30.
Chicago, 350 tons, training college for Salvation Army.
State of Nebraska, 1300 tons, highway bridges.
Ottawa, Ill., 1800 tons, highway bridge; bids to be opened Oct. 4.
Chicago, 700 tons, State group for World's Fair; general contract awarded.

WESTERN STATES

Pasadena, Cal., 120 tons, Pine Canyon dam gate structures; Consolidated Steel Corp., low bidder.
Los Angeles County, Cal., 260 tons, San Gabriel River National Forest bridge; bids close Sept. 29.
Los Angeles County, Cal., 140 tons, Del Amo Avenue County bridge, bids closed Sept. 19.
Sanders County, Mont., 280 tons, Missoula River State highway bridge; bids close Sept. 20.
Oroville, Cal., 115 tons, post office.
State of California, 112 tons, post offices at Napa and Palo Alto.

FABRICATED PLATES

AWARDS

Boston, 245 tons, tanks for Cities Service Refining Co., to Warren City Tank & Boiler Co.
Memphis, Tenn., 168 tons, 14 pontoons for United States Engineers, to St. Louis Structural Steel Co.
Memphis, 228 tons, discharge pipe for United States Engineers, to Midland Barge Co.

NEW PROJECTS

St. Louis, 650 tons, 40 steel pontoons and 38 trucks for United States Engineers; bids to be opened Sept. 26.

Reinforcing Steel

Awards 6500 Tons—New Projects 1400 Tons

AWARDS

Rochester, N. Y., 325 tons, post office, to Kalman Steel Corp.
Newark, N. J., 500 tons, post office and court house, to Kalman Steel Corp.
Philadelphia, 650 tons, Girls' High School, to American Steel Engineering Co.
Birmingham, Ala., 200 tons, sewage plant for Jefferson County, to Truscon Steel Co.
Bismarck, N. D., 400 tons, State capitol building, to Laclede Steel Co.
Milwaukee, 450 tons, Watertown Plank Road, overhead, to Joseph T. Ryerson & Son, Inc.
State of Illinois, 200 tons, road work, to Olney J. Dean & Co.
St. Louis, 1800 tons, municipal auditorium, to Laclede Steel Co. and Missouri Rolling Mills Corp.
St. Louis, 150 tons, municipal negro hospital, to Truscon Steel Co.
San Rafael, Cal., 600 tons, buildings for Hamilton Field Army Bombing Base, to Pacific Coast Steel Corp.
Los Angeles, 112 tons, Verdugo Wash bridge, to Blue Diamond Corp.
San Francisco, 1075 tons, Hetch-Hetchy water project tunnel structures, to Soule Steel Co.

NEW REINFORCING BAR PROJECTS

Hempstead, N. Y., unstated tonnage, Malverne School.
Stapleton, N. Y., 500 tons, United States Marine Hospital; bids Oct. 4.
Philadelphia, 800 tons, post office, Starrett Brothers & Eken, Inc., New York, general contractor.
Louisville, Ky., 3300 tons, sewer; S. A. Healy, Detroit, low bidder on general contract.
State of Wisconsin, 200 tons, Buffalo and Pepin County bridges, Nos. 3, 4 and 5, Industrial Contracting Co., Minneapolis, low bidder; Nos. 6, 7 and 8, 100 tons, American Bridge Co., low bidder.
Ventura County, Cal., 122 tons, National Forest highway structures; bids close Oct. 6.
State of Montana, 174 tons, highway structures and bridges; bids closed Sept. 20.
Jackson County, Ore., 140 tons, Diamond Lake National Forest highway bridge; bids close Oct. 5.
Palo Alto, Cal., 120 tons, post office.
State of California, 160 tons, post offices at Napa, Marysville and Oroville.
Claremont, Cal., 100 tons, swimming pool at Scripps College.

Willys-Overland to Make Light Motor Truck

The International Harvester Co. is making final tests at Chicago on a $\frac{1}{2}$ -ton, six-cylinder motor truck to be manufactured to its specifications by the Willys-Overland Co., Toledo, and marketed by the Harvester company through its sales organization and under its name.

Aluminum products manufactured in 1931 by 131 establishments reporting to the Bureau of the Census were valued at \$70,582,470, a decrease of 56 per cent as compared with \$161,994,398 reported by 150 plants for 1929.

Non-Ferrous Metal Markets Are Hesitant, With Outlook Uncertain

NEW YORK, Sept. 20.—Domestic interest in copper is lethargic.

With business sentiment momentarily reflecting a partial reversal of the recent optimistic outlook, the probable trend of early future demand is somewhat vague. Consumers are particularly hesitant about absorbing first quarter offerings, despite the fact that the current quotation for electrolytic of 6.25c., Connecticut basis, has been extended to meet that delivery. Although there are intimations that firm bids on nearby metal would bring out concessions from outside quarters, leading copper interests are apparently maintaining a firm price position and would not be disposed to meet lower competition that might attend liquidation of speculative holdings. Foreign markets have been relatively quiet during the week. Copper Exporters, Inc., continues to post 6.25c., c.i.f. European ports, but in the face of lower foreign offerings the volume of export sales at that figure has been negligible. Foreign copper prices ranged during the week from 5.90c. to the current level of 6c., usual destinations.

Lake copper is quiet and quotably unchanged at 6.37½c., delivered.

Tin

A dwindling demand has softened the New York price of tin, which today was 24.35c., compared with 24.50c. a week ago. Current buying is negligible and indicates an uncertain attitude among tin consumers with respect to future business. The London price of tin recouped part of its losses of last week, with today's market £149 10s. a ton for spot standard, £151 5s. for future standard and £154 15s. for spot Straits. The Singapore market today, at £153 5s., was £2 10s. lower than a week ago. Warehouse stocks of tin in the United Kingdom decreased 256 tons to 31,955 tons. Straits shipments up to and including Sept. 17 aggregated 2926 tons.

Lead

With an accumulation of stocks attending a 10-day lull in lead buying, the leading Eastern smelter reduced its contract basing price today to 3.50c., New York. The chief Midwestern factor, however, is maintain-

ing its position at 3.45c., St. Louis. Current demand is lagging, with sales restricted to car lots. Lead statistics for August disclosed a reduction in refined stocks of about 4800 tons during that month. This shrinkage was accounted for largely by August shipments of 28,200 tons, representing an increase of 8500 tons over July deliveries. The upturn in total deliveries was offset to some extent, however, by an increase of 3800 tons in August production over the July output.

Zinc

A steady retreat of buying interest has forced the price of zinc down to 3.25c. to 3.30c., East St. Louis, and 3.62c. to 3.67c., New York. Most of the pressure toward lower levels has emanated from second hands. Leading producers, however, are exerting little effort to dispose of metal at less than 3.30c., East St. Louis, and 3.67c., New York. The bulk of recent transactions has represented immediate consumptive needs, indicating that consumer inventories are generally at a low point. Total sales in the past week amounted to 1500 tons.

The Week's Prices. Cents Per Pound for Early Delivery

	Sept. 14	Sept. 15	Sept. 16	Sept. 17	Sept. 19	Sept. 20
Lake copper, New York.....	6.37½	6.37½	6.37½	6.37½	6.37½	6.37½
Electrolytic copper, N. Y.*.....	6.00	6.00	6.00	6.00	6.00	6.00
Straits tin, spot, N. Y.....	24.95	24.50	24.50	....	23.87½	24.35
Zinc, East St. Louis.....	3.40	3.35	3.35	3.35	3.25	3.25
Zinc, New York.....	3.77	3.72	3.72	3.72	3.62	3.62
Lead, St. Louis.....	3.45	3.45	3.45	3.45	3.45	3.45
Lead, New York.....	3.60	3.60	3.60	3.60	3.60	3.50

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel, electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 5.62½c. a lb., New York.
Brass ingots, 85-5-5-5, 6.25c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig.....	26.50c. to 27.50c.
Tin, bar.....	28.50c. to 30.50c.
Copper, Lake.....	7.75c. to 8.75c.
Copper, electrolytic.....	7.50c. to 8.50c.
Copper, casting.....	7.25c. to 8.25c.
*Copper sheets, hot-rolled.....	15.37½c.
*High brass sheets.....	12.50c.
*Seamless brass tubes.....	15.25c.
*Seamless copper tubes.....	14.37½c.
*Brass rods.....	10.25c.
Zinc, slabs.....	4.37½c. to 4.87½c.
Zinc sheets (No. 9), casks.....	9.25c. to 9.50c.
Lead, American pig.....	4.25c. to 4.75c.
Lead, bar.....	5.75c. to 6.75c.
Lead sheets.....	8.00c.
Antimony, Asiatic.....	8.00c. to 9.00c.
Alum., virgin, 99 per cent plus.....	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent.....	16.00c.
Solder, ½ and ⅓.....	15.75c. to 16.75c.
Babbitt metal, commercial grade.....	21.00c. to 32.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig.....	27.50c.
Tin, bar.....	29.50c.

Copper, Lake.....	7.25c.
Copper, electrolytic.....	7.25c.
Copper, casting.....	6.875c.
Zinc, slab.....	4.25c. to 4.50c.
Lead, American pig.....	4.00c. to 4.25c.
Lead, bar.....	7.25c.
Antimony, Asiatic.....	8.50c.
Babbitt metal, medium grade.....	16.50c.
Babbitt metal, high grade.....	32.00c.
Solder, ½ and ⅓.....	17.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	4.625c.	5.375c.
Copper, hvy. and wire	4.50c.	5.25c.
Copper, light and bottoms	3.625c.	4.25c.
Brass, heavy.....	2.50c.	3.00c.
Brass, light.....	2.00c.	2.50c.
Hvy. machine composition.....	3.50c.	4.25c.
No. 1 yel. brass turnings	2.75c.	3.125c.
No. 1 red brass or compos. turnings..	3.00c.	3.75c.
Lead, heavy.....	2.875c.	3.25c.
Zinc.....	1.375c.	1.75c.
Cast aluminum.....	2.75c.	4.25c.
Sheet aluminum.....	6.50c.	8.00c.

Railroad Equipment

Shipments of railroad locomotives in August totaled nine units, all electric for domestic account, identical with July shipments, according to reports received by the Bureau of the Census from principal manufacturing plants. Shipments in the first eight months of 1932 were 66 locomotives, 32 steam and 25 electric for domestic account, and seven steam and two electric for foreign account. Shipments in the corresponding period of last year totaled 138 units. Unfilled orders at the end of August this year totaled 112 locomotives, of which only one was of steam type. Unfilled orders at the end of July were 121 units, only one being of steam type.

Lake Shore Mining Co., Kirkland Lake, Ont., has purchased one 30-cu. yd. air dump car from National Steel Car Corp.

United States Potash Co. has purchased through C. C. Moore & Co., San Francisco, 12 25-ton gable-bottom cars from Magor Car Corp.

Cast Iron Pipe

Springfield, Ill., will buy 2000 tons of large diameter pipe for a filtration plant.

Kenosha, Wis., is taking bids this week on a round tonnage for a sewage disposal plant.

Fresno, Cal., opens bids Sept. 23 for 224 tons of class 150, 4- to 10-in. in 16 ft. lengths.

Bureau of Yards and Docks, Navy Department, Washington, will open bids Nov. 2 for 168 tons of 6-in. for the ammunition depot at West Loch, Oahu, Hawaii, specification No. 6746.

Suburban Water Co. has plans for new cast iron mains in Mountain View, Sunnyvale, Los Altos and Cupertino districts in Santa Clara County, Cal., to cost, with booster pumping stations, about \$100,000.

City Council, Seattle, recently voted \$2,000,000 for water system improvements, including new 16- and 24-in. mains.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.91c.
Del'd New York	1.95c.
Del'd Detroit	1.80c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.75c.
C.I.F. Pacific ports	2.10c.

Billet Steel Reinforcing (as quoted by distributors)

F.o.b. P'gh mills, 40, 50, 60-ft.	1.60c.
F.o.b. Birmingham, mill lengths	1.75c.
F.o.b. Cleveland	1.60c. to 1.75c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.35c. to 1.45c.
F.o.b. Chicago Heights mills	1.50c.

Iron

Common iron, f.o.b. Chicago	1.60c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.11c.
Common iron, del'd New York	2.15c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7935c.
F.o.b. Coatesville	1.70c.
F.o.b. Sparrows Point	1.70c.
Del'd New York	1.898c.
C.I.F. Pacific ports	2.00c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
F.o.b. Lackawanna	1.70c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7935c.
Del'd New York	1.8675c.
C.I.F. Pacific ports (standard)	2.10c.
C.I.F. Pacific ports (wide flange)	2.20c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago mill	2.05c.
F.o.b. Buffalo	2.00c.

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.45c. to 2.65c.	per Lb.
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S.A.E. Series	Alloy	Differential
Numbers	per 100 Lb.	
2000 (1% Nickel)		\$0.25
2100 (1 1/2% Nickel)		0.35
2300 (3/4% Nickel)		1.50
2500 (5% Nickel)		2.25
3100 Nickel Chromium		0.55
3200 Nickel Chromium		1.35
3300 Nickel Chromium		3.80
3400 Nickel Chromium		3.20
4100 Chromium Molybdenum (0.18 to 0.25 Molybdenum)		0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)		0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum)		1.50
5100 Chromium Steel (0.60 to 0.90 Chromium)		1.05
5100 Chromium Steel (0.80 to 1.10 Chromium)		0.35
5100 Chromium Spring Steel		0.45
6100 Chromium Vanadium Bar		1.20
4100 Chromium Vanadium Spring Steel		0.95
9250 Silicon Manganese Spring Steel (flats)		0.25
Rounds and Squares		0.50
Chromium Nickel Vanadium		1.50
Carbon Vanadium		0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is 3/4c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/2 in. thick, regardless of sectional area, take the bar price.

Cold Finished Bars*

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	1.70c.
Bars, f.o.b. Chicago	1.75c.
Bars, Cleveland	1.75c.
Bars, Buffalo	1.75c.
Bars, Detroit	1.75c.
Bars, eastern Michigan	1.95c.
Shafting, ground, f.o.b. mill	2.05c. to 3.00c.

*In quantities of 10,000 to 19,999 lb.
*According to size.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot-Rolled

	Base per Lb.
No. 10 f.o.b. Pittsburgh	1.55c.
No. 10 f.o.b. Chicago mill	1.65c.
No. 10 del'd Philadelphia	1.88c.
No. 10 f.o.b. Birmingham	1.70c.
No. 10, c.i.f. Pacific Coast ports	2.17 1/2c.

Hot-rolled and Annealed

No. 10, Pittsburgh	1.70c.
No. 10, Chicago mills	1.80c.
No. 10, Birmingham	1.85c.
No. 10, Pacific Coast ports	2.32 1/2c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.10c. to 2.20c.
No. 24, f.o.b. Chicago mills	2.20c. to 2.30c.
No. 24, del'd Philadelphia	2.40c. to 2.51c.
No. 24, f.o.b. Birmingham	2.25c. to 2.35c.
No. 24, c.i.f. Pacific Coast ports	2.85c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.15c. to 2.25c.
No. 10 gage, f.o.b. Chicago mills	2.25c. to 2.35c.
No. 10, gage, del'd Philadelphia	2.40c. to 2.50c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.60c. to 2.75c.
No. 20 gage, f.o.b. Chicago mills	2.70c. to 2.85c.
No. 20 gage, del'd Philadelphia	2.91c. to 3.06c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	2.75c.
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Steel Furniture Sheets

No. 10, f.o.b. Pittsburgh	2.55c. to 2.65c.
No. 20, f.o.b. Pittsburgh	3.05c. to 3.15c.

(Prices on furniture stock include stretcher leveling but not resquaring.)

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.75c. to 2.85c.
No. 24, f.o.b. Chicago mills	2.85c. to 2.95c.
No. 24, del'd Philadelphia	3.06c. to 3.16c.
No. 24, f.o.b. Birmingham	2.90c. to 3.00c.
No. 24, c.i.f. Pacific Coast ports	3.50c.

Long Ternes

No. 24, unassorted, 8-lb. coating, f.o.b. P'gh	2.80c.
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Vitreous Enameling Stock

No. 10, f.o.b. Pittsburgh	2.50c. to 2.60c.
No. 20, f.o.b. Pittsburgh	3.00c. to 3.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.30c. to 2.40c.
No. 28, Chicago mill	2.40c. to 2.50c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mill	\$4.75
Standard cokes, f.o.b. Gary	4.85

Terne Plate

(F.o.b. Morgantown or Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C.	\$9.50
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.10
30-lb. coating I.C.	14.90
40-lb. coating I.C.	16.70

Hot-rolled Hoops, Bands and Strips

	Base per Lb.
All widths up to 24 in., Pittsburgh	1.45c.
All widths up to 24 in., Chicago	1.50c.
Cooperage stock, P'gh	1.55c. to 1.60c.
Cooperage stock, Chicago	1.65c. to 1.70c.

Cold-Rolled Strips

F.o.b. Pittsburgh	1.90c. to 2.00c.
F.o.b. Cleveland	1.90c. to 2.00c.
Del'd Chicago	2.30c. to 2.30c.
F.o.b. Worcester	2.20c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	2.75c. to 2.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)

(After Dec. 31, extras of 10c. a 100 lb. on mixed and joint carloads, 25c. on pool carloads and 40c. on less than carloads will be applied on all merchant wire products.)

To Manufacturing Trade

Bright wire	2.20c.
Spring wire	3.20c.

To Jobbing Trade

	Base per Keg
Standard wire nails	\$1.95
Smooth coated nails	1.95
Galvanized nails	3.95

Base per Lb.

Smooth annealed wire	2.35c.
Smooth galvanized wire	2.80c.
Polished staples	2.50c.
Galvanized staples	2.75c.
Barbed wire, galvanized	2.60c.

STEEL PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Inches	Steel	Black Galv.	Inches	Iron	Black Galv.
1/2	51 1/2	25 1/2	1/2	4 1/2	9 + 34
3/4	57	31	3/4	5 1/2	10
1	62	36 1/2	1	6 1/2	11
1 1/4	65 1/2	40 1/2	1 1/4	7 1/2	12
1 1/2	67 1/2	42 1/2	1 1/2	8 1/2	13

Lap Weld

2	61	50 1/2	2	25	11
2 1/2	64 1/2	54	2 1/2	30	15
3	68 1/2	58 1/2	3	35	19
3 1/2	72 1/2	62 1/2	3 1/2	40	23
4	76 1/2	66 1/2	4	45	27
4 1/2	80 1/2	70 1/2	4 1/2	50	31

5	84 1/2	74 1/2	5	55	35
5 1/2	88 1/2	78 1/2	5 1/2	60	39
6	92 1/2	82 1/2	6	65	43
6 1/2	96 1/2	86 1/2	6 1/2	70	47
7	100 1/2	90 1/2	7	75	51
7 1/2	104 1/2	94 1/2	7 1/2	80	55

8	108 1/2	98 1/2	8	85	59
8 1/2	112 1/2	102 1/2	8 1/2	90	63
9	116 1/2	106 1/2	9	95	67
9 1/2	120 1/2	110 1/2	9 1/2	100	71
10	124 1/2	114 1/2	10	105	75
10 1/2	128 1/2	118 1/2	10 1/2	110	79

11	132 1/2	122 1/2	11	115	83
11 1/2	136 1/2	126 1/2	11 1/2	120	87
12	140 1/2	130 1/2	12	125	91
12 1/2	144 1/2	134 1/2	12 1/2	130	95
13	148 1/2	138 1/2	13	135	99
13 1/2	152 1/2	142 1/2	13 1/2	140	103

Discounts on steel pipe are net and not subject to any points or preferentials. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 3 1/2%.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel	Charcoal Iron
2 in. and 2 1/2 in.	1 1/2 in.
3 in.	1 3/4 in.
3 1/2 in.—2 3/4 in.	2 in.—2 1/4 in.
3 in.	2 1/2 in.—2 3/4 in.
3 1/2 in.—3 3/4 in.	3 in.
4 in.	3 1/2 in. to 3 3/4 in.
4 1/2 in. to 6 in.	4 in.
	4 1/2 in.

(F.o.b. Pittsburgh or Youngstown)	
	Per Lb.
Grooved	1.60c
Universal	1.60c
Sheared	1.60c

Wire Rods	
(Common soft, base)	
	Per Gross Ton
Pittsburgh	\$37.00
Cleveland	37.00
Chicago	38.00

COKE, COAL AND FUEL OIL

Coke	
	Per Net Ton
Furnace, f.o.b. Connellsville	\$2.00
Furnace, f.o.b. Connellsville	\$2.75 to 4.25
Foundry, by-product, Chicago	7.00
Foundry, by-product, delivered in Chicago switching district	7.75
Foundry, by-product, New England, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd.	8.20 to 8.81
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	7.82
Foundry, Birmingham	5.00
Foundry, by-products, St. Louis, f.o.b. ovens	8.00
Foundry, by-products, del'd St. Louis	9.00

Coal	
	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.20 to \$1.30
Mine run coking coal, f.o.b. W. Pa. mines	1.30 to 1.40
Gas coal, 1/2-in., f.o.b. Pa. mines	1.30 to 1.40
Mine run gas coal, f.o.b. Pa. mines	1.30 to 1.40
Steam slack, f.o.b. W. Pa. mines	0.50 to 0.65
Gas slack, f.o.b. W. Pa. mines	0.50 to 0.65

Fuel Oil	
	Per Gal. f.o.b. Bayonne, N. J.
No. 3 distillate	4.00c
No. 4 industrial	3.50c
	Per Gal. f.o.b. Baltimore
No. 3 distillate	4.00c
No. 4 industrial	3.50c
	Per Gal. del'd Chicago
No. 3 industrial fuel oil	2.75c
No. 5 industrial fuel oil	2.45c
	Per Gal. f.o.b. Cleveland
No. 3 distillate	5.00c
No. 4 industrial	4.50c

REFRACTORIES

Fire Clay Brick	
	Per 1000 f.o.b. Works
High-heat Intermediate Duty Brick	
Penn.	\$35.00 to \$50.00
Maryland	35.00 to 50.00
New Jer.	\$44.00 to 57.00
Ohio	35.00 to 50.00
Kentucky	35.00 to 50.00
Missouri	35.00 to 50.00
Illinois	35.00 to 50.00
Ground fire clay, per ton	6.50

Chrome Brick	
	Per Net Ton
Standard size	\$42.50

Silica Brick	
	Per 1000 f.o.b. Works
Pennsylvania	\$38.00
Chicago	47.00
Birmingham	56.00
Silica clay, per ton	8.00

Magnesite Brick	
	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	\$61.50
Unburned, f.o.b. Baltimore	\$2.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	38.50
Domestic, f.o.b. Chewelah, Wash.	20.90

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	\$38.40 to \$41.40
4-in., del'd Chicago	41.40 to 44.40
6-in. and larger, del'd New York	31.30
4-in., del'd New York	34.30
6-in. and larger, Birm'ham	\$32.00 to 33.00
4-in., Birmingham	35.00 to 36.00

Class "A" and gas pipe, \$3 extra.

Pig Iron, Ores, Ferroalloys

VALLEY	
	Per gross ton, f.o.b. Valley furnace:
Basic	\$13.50
Bessemer	15.00
Gray forge	14.50
No. 2 foundry	14.50
No. 3 foundry	14.00
Malleable	\$14.50 to 15.00
Low phos., copper free	23.00 to 25.00

Freight rate to Pittsburgh or Cleveland district, \$1.89.

PITTSBURGH	
	Per gross ton, f.o.b. Pittsburgh district furnace:
Basic	\$14.00
No. 2 foundry	15.00
No. 3 foundry	14.50
Malleable	15.00
Bessemer	15.00

Freight rates to points in Pittsburgh district range from 69c. to \$1.26.

CHICAGO	
	Per gross ton at Chicago furnace:
N'th'n No. 2 fdy.	\$15.50
N'th'n No. 1 fdy.	16.00
Malleable, not over 2.25 sil.	15.50
High phosphorus	15.50
Lake Super. charcoal, sil. 1.50, by rail	23.17
Southern No. 2 fdy.	16.14
Low phos. sil. 1 to 2, Copper free	25.00
Silvery, sil. 8 per cent.	23.67
Bess. ferroil'n, 15 per cent.	23.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS	
	Per gross ton at St. Louis:
No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City	\$17.50
Malleable, f.o.b. Granite City	17.50
Northern No. 2 fdy., del'd St. Louis	\$18.30 to 18.80
Southern No. 2 fdy., del'd	14.56
Northern malleable, del'd	18.30 to 18.80
Northern basic, del'd	18.30 to 18.80

Freight rates 83c. (average) Granite City to St. Louis; \$2.30 from Chicago; \$4.56 from Birmingham.

NEW YORK	
	Per gross ton, delivered New York district:
* Buffalo, No. 2, del'd east	\$17.41 to \$17.66
East Pa. No. 2 fdy.	15.02 to 15.52
East Pa. No. 2X fdy.	15.52 to 16.02

Freight rates: \$1.52 to \$2.63 from eastern Pennsylvania.
* Prices delivered to New Jersey cities having rate of \$3.41 a ton from Buffalo.

BUFFALO	
	Per gross ton, f.o.b. furnace:
No. 2 fdy.	\$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. up to 2.25	16.50
Basic	15.50
Lake Superior charcoal, del'd	23.41

NEW ENGLAND	
	Per gross ton delivered to most New England points:
* Buffalo, sil. 1.75 to 2.25	\$19.50 to \$20.05
* Buffalo, sil. 2.25 to 2.75	19.05 to 20.05
* Buffalo, sil. 1.75 to 2.25	17.41 to 18.91
* Buffalo, sil. 2.25 to 2.75	17.41 to 18.91
* Ala., sil. 1.75 to 2.25	19.74
* Ala., sil. 2.25 to 2.75	20.24
* Ala., sil. 1.75 to 2.25	15.88
* Ala., sil. 2.25 to 2.75	16.28

Freight rates: \$5.05 all rail from Buffalo, and \$3.41 to \$3.91 rail and water from Buffalo when \$1 barge and \$2 to \$2.50 New England freight rate are obtainable; \$9.75 all rail from Alabama and \$5.88 rail and water from Alabama to New England seaboard.
* All-rail rate.
† Rail-and-water rate.

CINCINNATI	
	Per gross ton, delivered Cincinnati:
Ala. fdy., sil. 1.75 to 2.25	\$13.82
Ala. fdy., sil. 2.25 to 2.75	14.32
Tenn. fdy., sil. 1.75 to 2.25	13.82
N'th'n No. 2 foundry	\$17.01 to 17.59
S'th'n Ohio silvery, 8%	21.02

Freight rates, \$2.02 from Ironton and Jackson, Ohio; \$3.82 from Birmingham.

PHILADELPHIA	
	Per gross ton at Philadelphia:
East. Pa. No. 2	\$13.34 to 14.34
East. Pa. No. 2X	14.34 to 14.84
East. Pa. No. 1X	14.84 to 15.34
Basic (del'd east. Pa.)	13.50 to 14.00
Malleable	16.50 to 18.00
Stand. low phos. (f.o.b. east. Pa. furnace)	20.50 to 21.50
Con. b'rg low phos. (f.o.b. furnace)	20.50 to 21.50
Va. No. 2	21.79
Va. No. 2X	22.29

Va. No. 2 plain	21.54 to 22.04
Va. No. 2X	22.04 to 22.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 84c. to \$1.79 from eastern Pennsylvania furnaces; \$4.67 from Virginia furnaces.

CLEVELAND	
	Per gross ton at Cleveland furnace:
N'th'n No. 2 fdy. (local delivery)	\$15.00
S'th'n fdy., sil. 1.75 to 2.25	16.14
Malleable (local delivery)	15.00
Ohio silvery, 8 per cent.	21.87
Stand. low. phos., Valley	23.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 63c. average local switching charge; \$3.12 from Jackson, Ohio; \$6.14 from Birmingham.

BIRMINGHAM	
	Per gross ton, f.o.b. Birmingham dist. furnace:
No. 2 fdy., sil. 1.75 to 2.25 sil.	\$11.00
No. 2 soft, 2.25 to 2.75 sil.	11.50
Basic	11.00

CANADA	
	Per gross ton:
Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	\$23.00 to 23.50

Ferromanganese	
	Per Gross Ton
Domestic, 80%, seaboard	\$68.00
Foreign, 80%, Atlantic or Gulf port, duty paid	68.00

Prices for lots of one carload or more; extras applied on less than carload lots.

Spiegeleisen	
	Per Gross Ton Furnace
Domestic, 19 to 21%	\$25.90

Electric Ferrosilicon	
	Per Gross Ton Delivered
50% (carloads)	\$77.50
50% (less carloads)	85.00
75% (carloads)	126.00
75% (less carloads)	136.00
14% to 16% (f.o.b.) Welland, Ont., in carloads	31.00
14% to 16% (less carloads)	36.00

Bessemer Ferrosilicon	
	F.o.b. Jackson County, Ohio, Furnace
	Per Gross Ton
10%	\$20.50
11%	21.00
12%	21.50
13%	22.50
14%	23.50
15%	24.00
16%	25.00
17%	26.50

Silvery Iron	
	F.o.b. Jackson County, Ohio, Furnace
	Per Gross Ton
6%	\$18.00
7%	18.50
8%	18.75
9%	19.00
10%	19.50
11%	20.00
12%	20.50
13%	21.50
14%	22.50
15%	23.00
16%	24.00
17%	25.00

Other Ferroalloys	
Ferrotungsten, per lb. wo. del. carloads	\$1.08

Ferrotungsten, less carloads	\$1.15 to \$1.30
Ferrocromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	10.00c
Ferrocromium, 2% carbon	17.00c to 17.50c
Ferrocromium, 1% carbon	19.00c to 20.00c
Ferrocromium, 0.10% carbon	23.50 to 25.00c
Ferrocromium, 0.06% carbon	25.50c to 27.00c
Ferrovandium, del. per lb. contained Va.	\$3.05 to \$3.30
Ferrocyanitilum, 15 to 18%, per net ton, f.o.b. furnace in carloads	160.00
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base	68.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton	\$91.00
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	105.00
1% carbon grade	115.00
Spot prices	\$5 a ton higher

Ores	
	Lake Superior Ores, Delivered Lower Lake Ports
	Per Gross Ton

Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.85
Measabi Bessemer, 51.50% iron	4.85
Measabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore	
	Per Unit

Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	8c. to 8.50c.
Iron, low phos., Swedish, average 68% iron	9.00c.
Iron, basic or foundry, Swedish, average 65% iron	8.00c.
Iron, basic or foundry, Russian, aver. 63% iron (nom.)	9.00c.
Manganese, Caucasian, washed 52%	24.00c.
Manganese, African, Indian, 50-52%	23c. to 24c.
Manganese, Brazilian, 46 to 48%	21c. to 22c.

Fluorspar	
	Per Net Ton
Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines	\$10.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	12.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	\$16.00 to 16.75
Domestic, No. 1 ground bulk, 85 to 98% calcium fluoride, not over 2% silicon, f.o.b. Illinois and Kentucky mines	30.00

Iron and Steel Scrap

PITTSBURGH	
	Per gross ton delivered consumers' yards:
No. 1 heavy melting steel	\$9.50 to \$10.00
No. 2 heavy melting steel	8.00 to 8.50
No. 2 railroad wrought	9.50 to 10.00
Scrap rails	9.50 to 10.00
Rails 3 ft. and under	10.50 to 11.00
Sheet bar crops, ordinary	9.50 to 10.00
Compressed sheet steel	9.50 to 10.00
Hand bundled sheet steel	8.00 to 8.50
Hvy. steel axle turnings	7.50 to 8.00
Machine shop turnings	6.00 to 6.50
Short shor. steel turnings	6.00 to 6.50
Short mixed borings and turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
Cast iron carwheels	8.00 to 8.50
Heavy breakable cast	8.00 to 8.50
No. 1 cast	9.50 to 10.50
Railr. knuckles and couplers	10.00 to 10.50
Rail. coil and leaf springs	10.00 to 10.50
Roller steel wheels	10.00 to 10.50
Low phos. billet crops	10.50 to 11.00
Low phos. sheet bar crops	11.50 to 12.00
Low phos. plate scrap	10.50 to 11.00
Low phos. punchings	10.50 to 11.00
Steel car axles	11.00 to 11.50

CHICAGO	
	Delivered Chicago district consumers:
	Per Gross Ton
Heavy melting steel	\$6.00 to \$6.50
Shoveling steel	6.00 to 6.50

Frogs, switches and guards	\$6.00 to \$6.50
Hydraulic comp. sheets	4.25 to 4.75
Drop forge flashings	4.00 to 4.50
No. 1 busheling	4.00 to 4.50
Rolled carwheels	8.00 to 8.50
Railroad tires	7.50 to 8.00
Railroad leaf springs	8.00 to 8.50
Axle turnings	4.50 to 5.00
Steel couplers and knuckles	7.00 to 7.50
Coil springs	8.50 to 9.00
Axle turnings (elec. fur.)	5.50 to 6.00
Low phos. punchings	8.00 to 8.50
Low phos. plates, 12 in. and under	8.00 to 8.50
Cast iron borings	4.00 to 4.50
Short shoveling turnings	4.00 to 4.50
Machine shop turnings	3.00 to 3.50
Revolving rails	7.00 to 7.50
Steel rails, less than 3 ft.	8.50 to 9.00
Steel rails, less than 2 ft.	9.00 to 9.50
Angle bars, steel	7.00 to 7.50
Cast iron carwheels	7.00 to 7.50
Railroad malleable	6.75 to 7.25
Agricultural malleable	5.00 to 5.50
* Relaying rails, 56 to 60 lb.	15.00 to 17.00
* Relay rails, 85 lb. and up	18.00 to 23.00

Per Net Ton		
Iron angle and splice bars	\$5.25 to	\$5.75
Iron arch bars, transoms	5.00 to	5.50
Iron car axles	11.00 to	11.50
Steel car axles	8.50 to	9.00
No. 1 railroad wrought	5.00 to	5.50
No. 2 railroad wrought	5.50 to	6.00
No. 1 busheling	2.50 to	3.00

No. 2 busheling.....	\$2.00 to \$2.50
Locomotive tires, smooth.....	7.50 to 8.50
Pipe and flues.....	1.25 to 1.75
No. 1 machinery cast.....	6.25 to 6.75
Clean automobile cast.....	6.75 to 7.25
No. 1 railroad cast.....	5.50 to 6.00
No. 1 agricultural cast.....	5.00 to 5.50
Store plate.....	5.50 to 6.00
Grate bars.....	5.25 to 5.75
Brake shoes.....	6.25 to 6.75

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

PHILADELPHIA

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel.....	\$7.00 to \$7.50
No. 2 heavy melting steel.....	5.50 to 6.00
No. 1 railroad wrought.....	7.50 to 8.00
Bundled sheets.....	4.00 to 4.50
Hydraulic compressed, new.....	6.00 to 6.50
Hydraulic compressed, old.....	4.00 to 4.50
Machine shop turnings.....	3.50 to 4.00
Heavy axle turnings.....	5.50 to 6.00
Cast borings (nom.).....	3.00 to 3.50
Heavy breakable cast.....	9.00 to 9.50
Store plate (steel works).....	6.50 to 7.00
No. 1 low phos. heavy.....	10.00 to 10.50
Couplers and knuckles.....	9.00 to 9.50
Roller steel wheels.....	9.00 to 9.50
No. 1 blast furnace (nom.).....	3.00 to 3.50
Spec. iron and steel pipe.....	5.50 to 6.00
Shafting.....	11.00 to 11.50
Steel axles.....	12.00 to 13.00
No. 1 forge fire.....	5.50 to 6.00
Cast iron car wheels.....	10.00 to 10.50
No. 1 cast.....	9.50 to 10.00
Cast borings (chem.).....	8.00 to 10.00
Steel rails for rolling.....	9.00 to 9.50

CLEVELAND

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel.....	\$7.00 to \$7.50
No. 2 heavy melting steel.....	6.50 to 7.00
Compressed sheet steel.....	6.50 to 7.00
Light bundled sheet stampings.....	4.50 to 5.00
Drop forge flashings.....	5.25 to 5.75
Machine shop turnings.....	4.50 to 5.00
Short shoveling turnings.....	4.50 to 5.00
No. 1 busheling.....	5.25 to 5.50
Steel axle turnings.....	5.00 to 5.50
Low phos. billet crops.....	10.00 to 11.00
Cast iron borings.....	3.50 to 4.00
Mixed borings and short turnings.....	3.50 to 4.00
No. 2 busheling.....	7.50 to 8.00
No. 1 cast.....	7.50 to 8.00
Railroad grate bars.....	5.00 to 5.50
Store plate.....	5.00 to 5.50
Knuckles and couplers.....	10.00 to 10.50
Roller steel wheels.....	10.00 to 10.50
Low phos. billet crops.....	9.00 to 9.50
Short shov. steel turnings.....	5.50 to 6.00
Short mixed borings and turnings.....	3.75 to 4.25
Cast iron borings.....	3.75 to 4.25
No. 2 busheling.....	3.50 to 4.00
Steel car axles.....	10.00 to 11.00
Iron axles.....	10.00 to 11.00
No. 1 machinery cast.....	9.50 to 10.00
No. 1 cupola cast.....	8.50 to 9.00
Store plate.....	6.50 to 7.00
Steel rails, 3 ft. and under.....	9.25 to 9.75
Cast iron car wheels.....	8.00 to 9.00
Industrial malleable.....	7.00 to 7.50
Railroad malleable.....	7.00 to 7.50
Chemical borings.....	7.50 to 8.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:	
No. 1 heavy melting steel.....	\$7.00 to \$7.50
No. 2 heavy melting steel.....	6.00 to 6.50
Scrap rails.....	6.75 to 7.25
New hydraulic comp. sheets.....	6.00 to 6.50
Old hydraulic comp. sheets.....	6.00 to 6.50
Drop forge flashings.....	6.00 to 6.50
No. 1 busheling.....	6.00 to 6.50
Hvy. steel axle turnings.....	6.00 to 6.50
Machine shop turnings.....	4.00 to 4.50
Knuckles and couplers.....	10.00 to 10.50
Roller steel wheels.....	10.00 to 10.50
Low phos. billet crops.....	9.00 to 9.50
Short shov. steel turnings.....	5.50 to 6.00
Short mixed borings and turnings.....	3.75 to 4.25
Cast iron borings.....	3.75 to 4.25
No. 2 busheling.....	3.50 to 4.00
Steel car axles.....	10.00 to 11.00
Iron axles.....	10.00 to 11.00
No. 1 machinery cast.....	9.50 to 10.00
No. 1 cupola cast.....	8.50 to 9.00
Store plate.....	6.50 to 7.00
Steel rails, 3 ft. and under.....	9.25 to 9.75
Cast iron car wheels.....	8.00 to 9.00
Industrial malleable.....	7.00 to 7.50
Railroad malleable.....	7.00 to 7.50
Chemical borings.....	7.50 to 8.00

BIRMINGHAM

Per gross ton delivered consumers' yards:	
Heavy melting steel.....	\$7.00 to \$7.50
Scrap steel rails.....	7.00 to 7.50
Short shoveling turnings.....	4.00 to 4.50
Store plate.....	6.00 to 6.50
Steel axles.....	9.00 to 9.50
Iron axles.....	4.50 to 5.00
No. 1 railroad wrought.....	8.00 to 8.50
Rails for rolling.....	4.50 to 5.00
No. 1 cast.....	8.50 to 9.00
Tramcar wheels.....	8.50 to 9.00
Cast iron borings, chem.....	8.50 to 9.00

ST. LOUIS

Per gross ton delivered consumers' yards:	
Selected heavy steel.....	\$6.00 to \$6.50
No. 1 heavy melting.....	5.50 to 6.00
No. 2 heavy melting.....	5.00 to 5.50
No. 1 locomotive tires.....	6.00 to 6.50
Misc. stand-sec. rails.....	6.00 to 6.50
Railroad springs.....	7.25 to 7.75
Bundled sheets.....	2.50 to 3.00
No. 2 railroad wrought.....	5.00 to 5.50
No. 1 busheling.....	3.00 to 3.50
Cast iron borings and shoveling turnings.....	2.75 to 3.25
Iron rails.....	7.00 to 7.50
Rails for rolling.....	7.00 to 7.50
Machine shop turnings.....	1.50 to 2.00
Heavy turnings.....	3.00 to 3.50
Steel car axles.....	3.50 to 4.00
Iron car axles.....	11.00 to 11.50
Wrot. iron bars and trans.....	5.00 to 5.50
No. 1 railroad wrought.....	3.50 to 4.00
Steel rails less than 3 ft.....	7.50 to 8.00
Steel angle bars.....	6.00 to 6.50

Cast iron car wheels.....	5.50 to 6.00
No. 1 machinery cast.....	6.50 to 7.00
Railroad malleable.....	4.50 to 5.00
No. 1 railroad cast.....	5.75 to 6.25
Store plate.....	5.50 to 6.00
Relay, rails, 60 lb. and under.....	16.00 to 16.50
Relay, rails, 60 lb. and over.....	20.00 to 21.00
Agricult. malleable.....	4.00 to 4.50

NEW YORK

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel.....	\$5.00
No. 2 heavy melting steel.....	3.50
Heavy melting steel (yard).....	1.50
No. 1 hvy. breakable cast.....	\$5.00 to 5.25
Store plate (steel works).....	2.25 to 2.75
Machine shop turnings.....	0.75 to 1.25
Short shoveling turnings.....	0.75 to 1.25
Cast borings.....	0.50 to 1.00
No. 1 blast furnace.....	0.50 to 1.00
Steel car axles.....	8.00 to 8.50
Spec. iron and steel pipe.....	2.00 to 2.50
Forge fire.....	3.25 to 3.75
No. 1 railroad wrought.....	4.00 to 4.50
No. 1 yard wrought, long.....	3.25 to 3.50
Rails for rolling.....	5.00 to 5.50
No. 1 cast.....	5.50 to 6.00
No. 2 cast.....	4.50 to 5.00
Store plate (foundry).....	4.75 to 5.00
Malleable cast (railroad).....	4.00 to 4.50
Cast borings (chemical).....	6.00 to 6.50

Per gross ton, delivered local foundries:	
No. 1 machinery cast.....	\$9.00 to \$9.50
No. 1 hvy. cast (cupola size).....	7.50 to 8.00
No. 2 cast.....	4.00 to 4.50

PITTSBURGH

Base per Lb.	
Plates.....	2.85c
Structural shapes.....	2.85c
Reinforcing bars and small shapes.....	2.60c
Reinforcing steel bars.....	2.60c
Cold-finished and screw stock.....	2.95c
Round and hexagons.....	2.95c
Squares and flats.....	3.45c
Hoops and bands, under 1/4 in.....	2.95c
Hot-rolled annealed sheets (No. 24).....	3.15c
25 or more bundles.....	3.15c
Galv. sheets (No. 24).....	3.15c
25 or more bundles.....	3.15c
Hot-rolled sheets (No. 10).....	3.10c
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.).....	\$3.74
Spikes, large.....	2.30c
Small.....	2.75c to 3.00c
Boat.....	3.00c
Track bolts, all sizes, per 100 count.....	70 per cent off list
Machine bolts, 100 count.....	70 per cent off list
Carriage bolts, 100 count.....	70 per cent off list
Nuts, all styles, 100 count.....	70 per cent off list
Large rivets, base per 100 lb.....	\$3.00
Wire, black, soft ann'l'd, base per 100 lb.....	2.75
Wire, galv., soft, base per 100 lb.....	3.20
Common wire nails, per keg.....	2.35
Cement coated nails, per keg.....	2.35

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

CHICAGO

Base per Lb.	
Plates and structural shapes.....	3.00c
Soft steel bars.....	2.75c
Reinforc. bars, blue steel.....	1.95c to 1.75c
Rail steel reinforcement.....	1.30c to 1.45c
Cold-fn. steel bars and shafting.....	3.00c
Round and hexagons.....	3.00c
Flats and squares.....	3.50c
Bands, 1/2 in. (in Nos. 10 and 12 gages).....	2.95c
Hoops (No. 14 gage and lighter).....	3.50c
Hot-rolled annealed sheets (No. 22).....	3.55c
Galv. sheets (No. 24).....	4.10c
Hot-rolled sheets (No. 10).....	3.20c
Spikes (1/2 in. and lighter).....	3.45c
Track bolts.....	3.20c
Rivets, structural.....	3.75c
Rivets, boiler.....	3.75c
Per Cent Off List	
Machine bolts.....	70
Carriage bolts.....	70
Coach and lag screws.....	70
Hot-pressed nuts, sq., tap. or blank.....	70
Hex. head cap screws.....	80
Cup point set screws.....	70 and 10
Flat head bright wood screws.....	52 1/2
Spring cotters.....	80
Store bolts.....	80
Rd. hd. tank rivets, 7/16 in. and smaller.....	65
Wrought washers.....	\$4.50 off list
No. 8 black ann'l'd wire, per 100 lb.....	\$3.45
Com. wire nails, base per keg.....	2.30
Cement c'd nails, base per keg.....	2.30

NEW YORK

Base per Lb.	
Plates and struc. shapes.....	2.70c to 3.10c
Soft steel bars, small shapes.....	2.70c to 3.10c
Iron bars, steel, char. steel.....	3.25c to 3.50c
Wire, black annealed (No. 10).....	3.60c
Wire, galv. annealed (No. 10).....	4.05c
Wire steel, 1/2 x 1/4 in. and larger.....	3.40c
Smooth finish, 1 to 2 1/4 x 1/4 in. and larger.....	3.75c

BOSTON

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel.....	\$3.35 to \$3.50
Scrap T rails.....	3.35
Machine shop turnings.....	0.80 to 1.00
Cast iron borings.....	1.05
Bundled skeleton, long.....	2.00 to 2.10
Forge flashings.....	3.00 to 3.50
Blast furnace scrap.....	0.90 to 1.00
Forge scrap.....	3.00 to 3.25
Shafting.....	9.50 to 10.00
Steel car axles.....	9.00 to 9.50
Wrought pipe.....	4.00 to 4.25
Rails for rolling.....	4.50 to 5.00
Cast iron borings, chemical.....	7.00 to 7.25

Per gross ton delivered consumers' yards:	
Textile cast.....	\$7.00 to \$7.50
No. 1 machinery cast.....	7.50 to 8.00
Store plate.....	5.00 to 5.25
Railroad malleable.....	10.50 to 11.00

CINCINNATI

Dealers' buying prices per gross ton:	
Heavy melting steel.....	\$6.00 to \$6.50
Scrap rails for melting.....	6.00 to 6.50
Loose sheet clippings.....	1.50 to 2.00
Bundled sheets.....	3.75 to 4.25
Cast iron borings.....	3.25 to 3.75
Machine shop turnings.....	3.00 to 3.50
No. 1 busheling.....	4.50 to 5.00
No. 2 busheling.....	3.25 to 3.75
Rails for rolling.....	6.50 to 7.00
No. 1 locomotive tires.....	7.50 to 8.00
Short rails.....	9.00 to 9.50
Cast iron car wheels.....	6.50 to 7.00
No. 1 machinery cast.....	8.25 to 8.75
No. 1 railroad cast.....	7.75 to 8.25

Burnt cast.....	4.25 to 4.75
Store plate.....	4.25 to 4.75
Agricultural malleable.....	7.75 to 8.25
Railroad malleable.....	8.25 to 8.75

DETROIT

Dealers' buying prices per gross ton:	
Hvy. melting steel.....	\$5.50 to \$6.00
Borings and short turnings.....	2.75 to 3.25
Long turnings.....	2.75 to 3.25
No. 1 machinery cast.....	7.75 to 8.25
Automotive cast.....	8.50 to 9.00
Hydraulic comp. sheets.....	5.25 to 5.75
Store plate.....	3.75 to 4.25
New No. 1 busheling.....	4.75 to 5.25
Old No. 2 busheling.....	1.50 to 2.00
Sheet clippings.....	2.00 to 2.50
Flashings.....	4.00 to 4.50

CANADA

Dealers' buying prices per gross ton:	
Toronto Montreal	
Heavy melting steel.....	\$7.00 \$6.00
Rails, scrap.....	7.00 8.00
No. 1 wrought.....	6.00 6.00
Machine shop turnings.....	2.00 2.00
Roller plate.....	5.00 4.50
Heavy axle turnings.....	2.50 2.50
Cast borings.....	2.00 2.00
Steel borings.....	2.00 2.00
Wrought pipe.....	2.00 2.00
Steel axles.....	7.00 9.00
Axles, wrought iron.....	7.00 11.00
No. 1 machinery cast.....	12.50 10.00
Store plate.....	10.00 8.00
Standard car wheels.....	10.00 8.50
Malleable.....	10.00 8.00

Warehouse Prices for Steel Products

Open-hearth spring steel, bases.....	
Common wire nails, base, per keg.....	\$2.00
Machine bolts, cut thread:	
1/2 x 6 in. and smaller.....	.65 to .65 and 10
1 x 30 in. and smaller.....	.65 to .65 and 10
Carriage bolts, cut thread:	
1/2 x 6 in. and smaller.....	.65 to .65 and 10
1 x 30 in. and smaller.....	.65 to .65 and 10
Boiler Tubes:	
Lap welded, 2-in.....	\$18.05
Seamless welded, 2-in.....	19.24
Charcoal iron, 2-in.....	24.94
Charcoal iron, 4-in.....	63.63

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

Base per Lb.	
Plates and struc. shapes.....	3.25c
Bars, soft steel or iron.....	3.00c
Cold-fn. rounds, shafting, screw stock.....	3.30c
Hot-rolled annealed sheets (No. 24).....	3.80c
Galv. sheets (No. 24).....	4.35c
Hot-rolled sheets (No. 10).....	3.45c
Black corrug. sheets (No. 24).....	3.85c
Galv. corrug. sheets.....	4.40c
Structural rivets.....	4.00c
Boiler rivets.....	4.00c
Tank rivets, 1/2 in. and smaller, 100 lb. or more:	
Less than 100 lb.....	65
Machine bolts.....	70
Carriage bolts.....	70
Lag screws.....	70
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	70
Less than 200 lb.....	60
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	70
Less than 200 lb.....	60

PHILADELPHIA

Base per Lb.	
*Plates, 1/2-in. and heavier.....	2.10c
*Structural shapes.....	2.10c
*Soft steel bars, small shapes, iron bars (except bands).....	2.10c
Reinforc. steel bars, sq., twisted and deform.....	2.20c
Cold-fn. steel, rounds and hex.....	3.35c
Cold-fn. steel, sq. and flats.....	3.85c
*Steel hoops.....	2.65c
*Steel bands, No. 12 to 3/16 in.....	2.40c
Incl.....	5.00c
Spring steel.....	5.00c
Hot-rolled annealed sheets (No. 24).....	3.55c
Hot-rolled annealed sheets (No. 24).....	3.75c
*Hot-rolled and annealed sheets (No. 10).....	2.55c
Diam. pat. floor plates, 1/2 in.....	5.00c
Swedish iron bars.....	5.60c

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.
*Base prices for 15,000 lb. orders; extra apply for smaller quantities.

CLEVELAND

CLEVELAND		Base per Lb.
Plates and struc. shapes		2.95c
Steel steel bars		2.75c
Reinforce steel bars		1.75c to 1.95c
Cold-fn. rounds and hex.		2.95c
Cold-fn. flats and sq.		3.45c
Flat rolled steel under $\frac{1}{4}$ in.		3.00c
Cold-finished strip		5.55c
Hot-rolled annealed sheet (No. 34)		2.75c
Hot-rolled sheet (No. 24)		2.75c
Hot-rolled sheets (No. 10)		2.75c
Black ann'l'd wire, per 100 lb.		\$2.75
No. 9 galv. wire, per 100 lb.		3.25c
Com. wire nails, base per keg.		2.35c

PLANT EXPANSION AND EQUIPMENT BUYING

August Machine Tool Orders Gained Slightly

Index Shows a Rise to 28.3 from 25.3 in Preceding Month—New England Outlook More Promising

THE National Machine Tool Builders' Association's index of machine tool orders gained three points in August, rising to 28.3 from 25.3 for July. However, the gain was not sufficient to raise the three-months' moving average, which, in fact, declined to 30.3 from 33.8 for July. The unfilled orders index advanced to 77.6 from 75.7 in the preceding month. Shipments were larger in August, being represented by the figure 29.9 against 26.6 for July.

There is undoubtedly greater interest among machinery users in prospective purchases, but thus far this interest has not been translated into much business. Of all of the industrial areas of the country, New England appears to be the most promising, chiefly because of the rise in textile activity in that section. However, machine tool sales even in New England have not shown much improvement. The outlook in the Middle West is somewhat better.

The Chicago territory contains a number of active prospects. A farm equipment manufacturer has quietly inquired for a number of tools, a new company may engage in the manufacture of electric refrigerators and air conditioning equipment, and an automobile company may spend about \$65,000 to rebuild some machinery.

The United States Government has asked for bids on about 20 machine tools for the Sunnyvale air base in California.

◀ NORTH ATLANTIC ▶

Signal Supply Officer, Army Base, Brooklyn, asks bids until Sept. 26 for 616,000 ft. wire (Circular 10), 20,000 insulators (Circular 13), 977 resistors (Circular 11).

American Smelting & Refining Co., 120 Broadway, New York, is arranging for purchase of controlling interest in Federated Metals Corp., 295 Madison Avenue, producer of Babbitt metal, copper, brass, lead, alloys, etc., with plants in Chicago, St. Louis, Detroit, Newark, N. J., and San Francisco, and will operate as an affiliated interest.

Tolhurst Auto Body Co., Inc., Watervliet, N. Y., has been organized by Arthur W. Tolhurst, 2612 Lavin Court, and Theodore C. Hailes, 6 Terrace Place, both Troy, N. Y., to manufacture automobile bodies and equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 27 for 240 acetylene cutting and welding regulators and 175 oxygen welding regulators (Schedule 8729); until Oct. 4, one motor-driven boring, drilling and milling machine (Schedule 8748) for Brooklyn Navy Yard.

Cyril J. Barfield, Long Island City, manufacturer of screws, studs and kindred products, has leased space in building at Fortieth Avenue and Twenty-third Street for new plant.

Board of Trustees, St. Joseph's Hospital, Far Rockaway, L. I., is having plans drawn for one-story workshop and hospital service building. Cost over \$60,000 with equipment. Henry V. Murphy, 208 Livingston Street, Brooklyn, is architect.

Central Railroad of New Jersey, 143 Liberty Street, New York, is arranging program for repair and reconstruction of locomotives, cars and marine equipment at company shops, and soon will recall over 450 men.

Style Metal Specialties, Inc., Brooklyn, has been organized by Paul Millman, 102 Taylor Street, Brooklyn, and Max Teitelbaum, 910 Prospect Avenue, Bronx, to manufacture metal products.

New York Central Railroad Co., New York, has reopened locomotive shops at West Albany, N. Y., closed early in August, reinstating about 1700 men.

Continental Can Co., 1 Pershing Square, New York, has increased production schedule at different plants and is now giving employment to about 8800 workers, largest number at any time this year. Plants at Baltimore, Camden, N. J., and Clearing, Ill., have been placed on day and night operating basis.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Oct. 5 for two motor-driven centrifugal pumps, chlorinating equipment, cast iron water pipe, etc.,

at naval ammunition depot, Lake Denmark, N. J. (Specification 6924).

Pacific Valley Sewerage Commission, 20 Branford Place, Newark, plans construction of sedimentation basins and installation of equipment at Newark Bay pumping plant. Cost over \$600,000.

General Lead Batteries Co., 125 Chapel Street, Newark, manufacturer of electric storage batteries, has advanced production schedules and is now running on full time basis.

Oil Equipment Laboratories, Inc., Elizabeth, N. J., has been organized by William H. and John C. Kleinhans, 715 Union Avenue, capital \$125,000, to manufacture oil burners and oil-burning equipment.

Quartermaster General C. Edward Murray, State House, Trenton, N. J., asks bids until Oct. 3 for oil boilers and heating apparatus, oil-burning equipment, etc., for armory at Orange, N. J.

Home Fuel Oil Co., 18 West Palisade Avenue, Englewood, N. J., W. G. Moore, manager, will take bids soon for bulk oil storage and distributing plant. Cost about \$70,000 with equipment.

Eisler Electric Corp., 760 South Thirteenth Street, Newark, manufacturer of machinery for production of radio tubes, lamps, etc., is increasing line of production to include spot welding machines and parts. Company is also continuing manufacture of oil burners and oil-burning equipment. Plant operations are being increased.

Trenton Marine Terminal, Arthur W. Dover, port manager, Municipal Building, Trenton, N. J., plans fund for purchase of material-handling equipment at harbor, including gantry cranes, tow motor tractor, lift truck, 12 hand trucks, tackle and tools, shovels, etc., and for gear room to be installed in terminal.

Naval Aircraft Factory, Navy Yard, Philadelphia, asks bids until Sept. 26 for two removal drills, two line-reaming fixtures, two alignment gages, two reamers and alignment bars, three facing tools, 20 spanner wrenches, five starter wrenches (Aero Reg. 645).

SKF Industries, Inc., 40 East Thirty-fourth Street, New York, manufacturer of ball and roller bearings, will remove plant from Hartford, Conn., to Philadelphia, where it will be consolidated at works of Hess-Bright Mfg. Co., Front Street and Erie Avenue, a subsidiary. This move is intended for greater concentration of manufacturing and to be closer to company's ball supply, Atlas Ball Co., Philadelphia, and to research laboratories.

Pruyn Ball Bearing Works, 4410 Paul Street, Philadelphia, has leased building at 1714 Fairmount Avenue for plant unit.

Graves Elevator Co., 280 Lyell Avenue, Rochester, N. Y., manufacturer of elevators

and equipment, has purchased plant and business of Otto Bernz & Co., Inc., 27 Ashland Street, Newark, N. J., manufacturer plumbers' and tinmiths' tools, etc. Newark plant will be removed to Rochester and will occupy a portion of Graves works. Joseph Willman will be general manager of Bernz division.

Sterling Range Corp., Rochester, N. Y., has been organized by Philip Will, 1 Highland Heights, Rochester, and Gilbert M. Thompson, 72 Empire Boulevard, Irondequoit, N. Y., to manufacture stoves and ranges, parts, etc.

Consolidated Aircraft Corp., 2050 Elmwood Avenue, Buffalo, is increasing production schedule for manufacture of 23 planes for Navy Department to cost about \$2,000,000, for which company recently secured contract. About 300 employees have been reinstated.

Maxwell Gas & Oil Corp., 190 York Street, Rochester, N. Y., plans rebuilding part of plant recently destroyed by fire. Loss over \$75,000 with equipment.

American Radiator Co., 40 West Fortieth Street, New York, and Petroleum Heat & Power Co., 511 Fifth Avenue, New York, have effected an arrangement whereby two companies, without merging their interests and without modifying their corporate identities, will jointly manufacture and market an automatic home-heating unit, to be known as Arco-Petro, with boiler and burner combined, using either oil or gas.

American Throttle Co., Inc., 60 East Forty-second Street, New York, has acquired patents and facilities of Bradford Corp., New York, pertaining to steam locomotive throttle valves, locomotive shut-off valves and steam separators.

Otis Elevator Co., Harrison, N. J., is running on improved production schedule at local plant and works at Yonkers, N. Y., following recent orders from Government and other sources totaling over \$1,000,000. In connection with a \$700,000 order for equipment for Federal buildings, cars will be made at Harrison plant, and hoisting equipment, motors, etc., at Yonkers.

Antaciron, Inc., Wellsville, N. Y., has been organized by James F. Campbell, Lancaster, N. Y., and associates to manufacture metal and metal alloy castings, and kindred products. Clinton D. Campbell, care of Standard Oil Co. of New York, 26 Broadway, New York, is interested in new company.

Consolidated Aircraft Corp., 2050 Elmwood Avenue, Buffalo, is beginning construction of 23 airplanes for Navy Department and will step-up production schedule, reinstating about 300 men. New plane units will cost \$2,000,000.

Elmira Water, Light & Railroad Co., Elmira, N. Y., plans extensions in transmission lines to Wellsburg, N. Y., and vicinity, by way of Ashland. Cost about \$35,000 with equipment.

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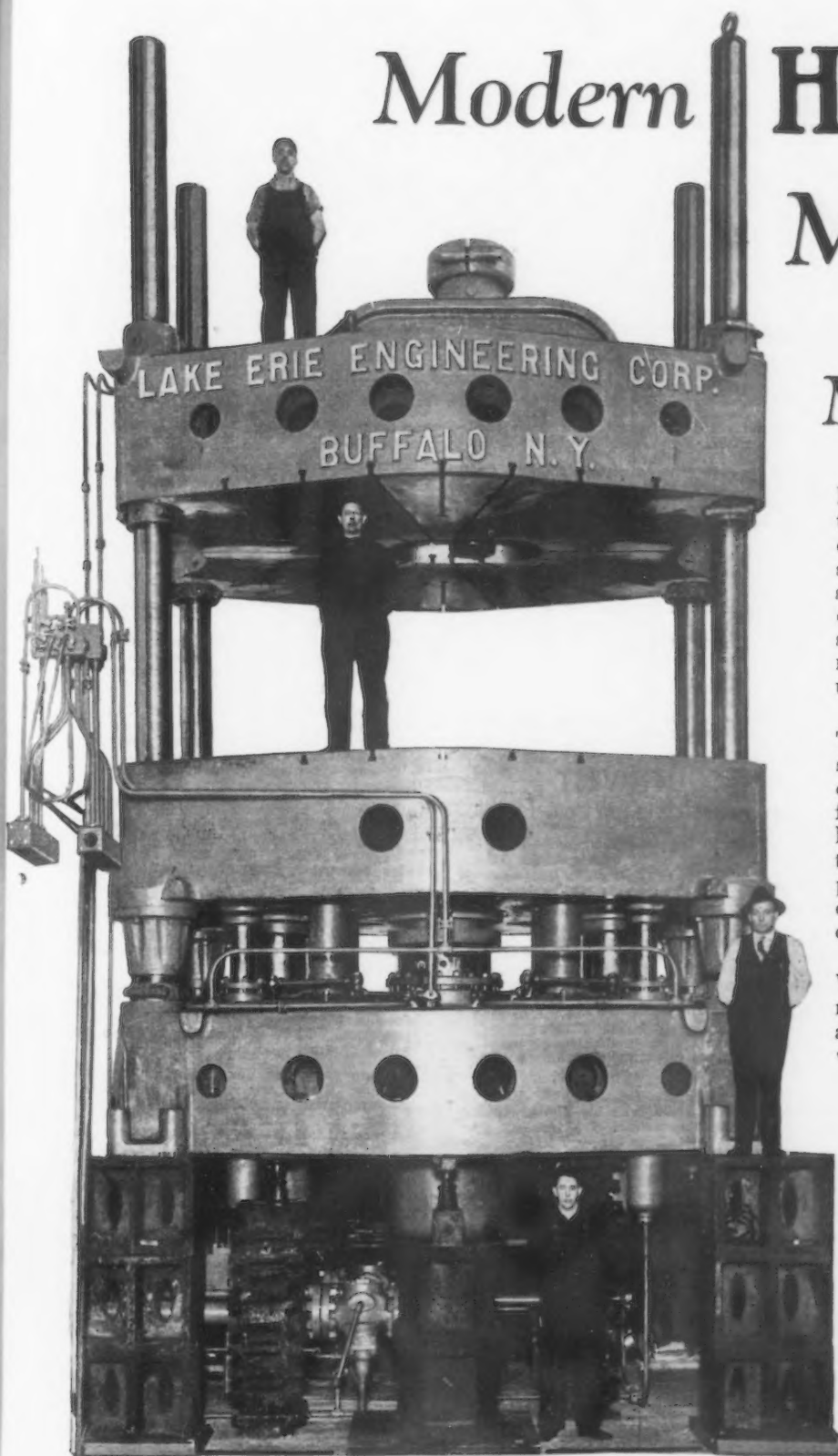
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◀ NEW ENGLAND ▶

Bird & Son, Inc., East Walpole, Mass., manufacturer of roofing products, fiber boxes, etc., has plans for one-story addition for storage and distribution, 80 x 84 ft., installation to include a traveling crane to connect with No. 1 shop, and other material-handling equipment.

New England Tank & Tower Co., Everett, Mass., manufacturer of tanks, towers, agitators, etc., plans new one-story plant, 50 x 140 ft. Cost over \$40,000 with equipment.

New Departure Mfg. Co., Bristol, Conn., manufacturer of ball bearings, etc., has increased production schedule and is now giving employment to about 1900 workers.

Plymouth Stove Works, Plymouth, Mass., has been organized by Bernard Field, Brookline, Mass., and associates, to manufacture stoves, ranges and kindred products.

C. O. Jelliff Mfg. Corp., Southport, Conn., manufacturer of wire cloth and allied products, has awarded general contract to O. F. Burghart, 333 North Avenue, Bridgeport, Conn., for one-story addition. Cost about \$24,000 with equipment.

Holyoke Co., Inc., Holyoke, Mass., manufacturer of insulated wire, notes marked improvement in its business and is now operating day and night with a double shift.

Waterbury Clock Co., Waterbury, Conn., is arranging for reorganization under direction of James R. Sheldon, Waterbury. Preferred stock issue of \$500,000 will be sold for operating fund. Company is developing increased production schedule and will reinstate about 300 employees, making working quota of 2000 persons. It was recently placed in temporary receivership.

Colonial Beacon Oil Co., Kensington Street, Portland, Me., has awarded general contract to Brown & Berry, Portland, for addition to oil storage and distributing plant. A new pumping plant will be installed. Cost about \$30,000 with equipment.

Raybestos Division of Raybestos-Manhattan, Inc., Bostwick Avenue, Bridgeport, Conn., manufacturer of brake lining, etc., has begun erection of two one-story additions to plant of subsidiary, Canadian Raybestos Co., Ltd., Peterborough, Ont., 60 x 150 ft., and 39 x 80 ft., respectively. Cost about \$50,000 with equipment.

Independent Lock Co., Fitchburg, Mass., manufacturer of locks, hardware specialties, etc., has purchased former local plant of Grant Yarn Mills, and will remodel for expansion. Purchasing company will remove Lockwood branch plant at South Norwalk, Conn., to Fitchburg, consolidating with main works and adding about 150 operatives to force.

United States Naval Torpedo Station, Newport, R. I., will hold a sale of surveyed material, including milling, grinding and cutting machines, on Oct. 5.

◀ SOUTH ATLANTIC ▶

Murray Steel Products Co., Baltimore, John A. Murray, head, has leased property at 9 East Hamilton Street for local plant.

Pangborn Corp., Hagerstown, Md., manufacturer of sandblast machinery, dust eliminating equipment, etc., has asked bids on general contract for one-story addition.

Board of District Commissioners, District Building, Washington, asks bids until Sept. 29 for 64 steel tables with seats for 384 persons, and eight section seats for 48 persons for district workhouse.

Lakeland Railway Co., Lakeland, Ga., is planning purchase of equipment and will also carry out construction program at Naylor, Ga. Fund is being secured.

City Commission, Jacksonville, Fla., T. C. Imeson, chairman, asks bids until Sept. 28 for new steel hangar at municipal airport, with repair and reconditioning facilities.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Oct. 5 for two centrifugal pumps with dual turbine and motor drive, and one similar type pump with motor drive for Portsmouth, N. H. Navy Yard (Specification 6941); lighting and power systems for hangars (Specification 7053).

Norlander Machine Co., New Bedford, Mass., manufacturer of textile machinery, parts, etc., will establish branch plant, primarily for repair and parts service, at Gastonia, N. C.

Town Council, Salem, Va., R. P. Bishop, city manager, is considering installation of steel standpipe for water service, 40 ft. diameter and 40 ft. high.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 27 for machine and wood screws (Schedule 8671); until Oct. 4, steel rivets and washers (Schedule 8727), malleable iron pipe fittings (Schedule 8744) for Eastern and Western yards, 1100 oilers and 339 oil fillers for Mare Island, Brooklyn and Puget Sound navy yards (Schedule 8723), 3500 ft. corrosion resistant steel cable (Schedule 8738) for Boston or Los Angeles, San Francisco or Puget Sound navy yards, brass washers (Schedule 8728) for various navy yards, 12 aircraft metal propeller blades (Schedule 8740) for Washington and Dayton, Ohio, naval stations, one motor-driven upright drill (Schedule 8743) for Boston or Los Angeles, San Francisco or Puget Sound navy yards; until Oct. 11, two 17,600-bbl. capacity steel oil tanks (Schedule 8734) for Boston, New York, Philadelphia or other navy yard.

Treasury Department, Washington, James A. Wetmore, acting supervising architect, has plans for power plant for central steam-heating service at Twelfth and C Streets, S. W., 108 x 202 ft., and will take bids soon for equipment. Project includes cranes and hoists and maintenance machine shop, in addition to general plant equipment. Cost over \$500,000 with machinery. **United Engineers & Constructors, Inc.**, 112 North Broad Street, Philadelphia, is consulting engineer; Paul P. Cret, Architects' Building, last noted city, is supervising architect.

City Council, High Point, N. C., is considering erection of a municipal electric light and power plant at city reservoir on Deep River. Cost over \$75,000 with equipment.

Lighting Committee, City Council, Tampa, Fla., is considering proposal for a municipal electric light and power plant. Cost about \$475,000 with equipment.

Slip-Stream Aircraft Co., care of Chamber of Commerce, Industrial Bureau, Richmond, Va., is negotiating with Chamber of Commerce for erection of new local aircraft works for manufacture of new type of all-metal dirigible, using Diesel-type engine units.

◀ SOUTHWEST ▶

Henderson Tire & Rubber Co., Columbus, Ohio, is establishing new mill at Tulsa, Okla., and will transfer Columbus plant to that location. A mechanical rubber goods department will also be installed. Cost close to \$50,000.

Sinclair Refining Co., 45 Nassau Street, New York, affiliated with Consolidated Oil Corp., same address, has awarded contract to Babcock & Wilcox Tube Co., Beaver Falls, Pa., for about 600 tons of alloy steel tubing for refineries at Argentine and Coffeyville, Kan., in connection with expansion and improvements to cost about \$2,000,000. Orders for other equipment will be placed soon. Sinclair company is resuming production at plant at first noted place following curtailment of several months.

Stearman Aircraft Co., Wichita, Kan., is increasing production schedule giving employment to about 100 men.

City Council, Idabel, Okla., is arranging special election to approve bond issue of \$100,000 for municipal electric light and power plant, with installation of two 180-hp. Diesel engine units, generators and accessory equipment. Russell & Axon, 6200 Easton Avenue, St. Louis, are consulting engineers.

Lone Star Cement Co., Bonner Springs, Kan., has resumed operations following shutdown of about two months, giving employment to about 150 men.

Western Luminous Tube Co., St. Louis, has been organized by L. B. Reichman and Robert L. Aronson, 411 North Seventh Street, capital \$200,000, to manufacture tube lighting equipment, electric displays, etc.

Common Council, Perry, Okla., is planning installation of a municipal gas plant. Cost over \$70,000 with equipment.

Midcontinent Steel & Iron Corp., Southland Life Building, Dallas, Tex., recently organized with capital of \$1,500,000, has taken over about 40,000 acres of iron ore lands near Ore City, Upshur County, Tex., and plans early development. Company also is selecting site near Dallas for new steel mill. Entire project to cost over \$500,000. D. R. Knapp is president.

United States Engineer Office, Eighth Corps Area, Fort Sam Houston, Tex., asks bids until Sept. 26 for galvanized iron sheets, galvanized ridge roll, corrugated iron nails, etc. (Circular 1).

Air Corps, United States Army, Washington, has renewed lease on Hensley Field, Dallas, Tex., and plans extensions and improvements

for hangars, repair shops and other field units. Cost about \$69,000.

Berger Ornamental Iron & Wire Works, Inc., Houston, Tex., has been organized by A. A. Berger and M. L. Rendelman, Jr., Houston, to manufacture iron and wire goods.

East Texas Refining Co., Longview, Tex., plans rebuilding part of oil refinery, including bubble towers, vats and other equipment, recently damaged by fire. Loss over \$45,000 with equipment.

◀ CENTRAL DISTRICT ▶

Climax Molybdenum Co., Union Trust Building, Pittsburgh, has awarded contract to Rust Engineering Co., Koppers Building, for one-story addition to mill at Langeloth, Pa., for furnace and crusher departments, ore storage bins, and other divisions. Cost about \$60,000 with equipment. Company is affiliated with American Metal Co., 61 Broadway, New York.

Steelcraft Corp., Pittsburgh, has been organized by Ernest W. Niederberger, 307 Otilla Street, and Robin Trimble, 464 Oneida Street, to manufacture ornamental and other iron and steel products.

Buckeye Coal Co., Nemacolin, Pa., is planning coal tipple in connection with new river terminal on Monongahela River for coal loading.

Firth-Sterling Steel Co., McKeesport, Pa., has awarded contract to Rust Engineering Co., Koppers Building, Pittsburgh, for addition to mill. Present wire works at Sharpsburg, Pa., operated under name of Globe Wire Co., will be removed to new unit. Cost about \$60,000 with equipment.

Bessemer Limestone & Cement Co., Bessemer, Pa., has resumed operations following shutdown for several months, reinstating large number of men.

United States Engineer Office, Pittsburgh, asks bids until Oct. 14 for construction of lock and dam No. 2, Allegheny River, to replace present locks and dams Nos. 1 and 2, Fourteen Mile Island, including four sets of lock gates and mechanisms.

Pursglove Estate, Thomas W. Pursglove, director, Martins Ferry, Ohio, is considering erection of a power plant at Willow Grove, Ohio, coal mining properties, in connection with expansion program. Cost over \$75,000 with equipment.

McNeil Machine & Engineering Co., Akron, Ohio, has been organized by Charles W. Berry and Charles E. Smoyer, 2110 First Central Trust Building, to manufacture special machinery and equipment.

Machined Steel Casting Co., Alliance, Ohio, has resumed operations following curtailment since early in June, reinstating about 75 men. This quota will be advanced to 100 men before end of month.

Cincinnati Union Terminal Co., Temple Bar Building, Cincinnati, will soon take bids for one-story mechanical shop and yard service building, 42 x 492 ft. Cost about \$270,000 with equipment. Col. H. M. Waite is chief engineer.

Contracting Officer, Material Division, Wright Field, Dayton, Ohio, asks bids until Sept. 27 for 185 tail wheel fork and post assemblies, 350 tail wheel fork axle spacers and 175 tail wheel axles (Circular 108); until Oct. 3, 6000 filler cap gaskets (Circular 110); until Oct. 5, 51 single and double-faced racks (Circular 107); until Oct. 10, motorized drive units for machine tools (Circular 113).

National Cash Register Co., Dayton, is advancing production schedule in several departments, adopting nine-hour day instead of eight-hour, as heretofore. Company has secured first allotment of \$3,000,000 order for cash registers from Safeway Stores, Inc., San Francisco, totaling about \$250,000. Entire order will aggregate 7000 registers.

Pierce, Butler, Pierce Mfg. Corp., Syracuse, N. Y., manufacturer of heating equipment, has reopened radiator manufacturing plant at Zanesville, Ohio, following curtailment for several weeks, giving employment to large working force.

Department of Public Service, Conneaut, Ohio, plans installation of municipal waterworks, including pumping plant, distributing system, filtration equipment, etc. Cost over \$200,000 with machinery. G. F. McKenzie is service director.

Perfect Circle Co., Hagerstown, Ind., is developing a new aluminum piston ring expander and will increase production schedule for complete line of such equipment for automobiles using aluminum pistons.

Mitchum & Schaefer, Inc., Indianapolis, has been organized by Michael P. Schaefer and

Now After **40 YEARS' EXPERIENCE**



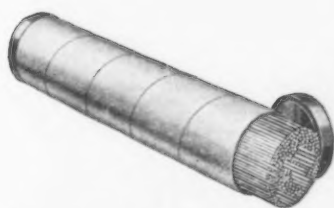
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The new product has qualified to bear the Champion name. Perfected after years of research, it has satisfied the implacable Champion demand that it shall insure a superior performance at a lower cost. Champion "Red Devil" Heavy Flux Coated Speed Welding Rods deliver more metal per layer, making possible fewer layers and less labor. They deposit a thin, uniform coating of slag which covers completely, yet removes easily. Champion Welding Rods speed the operation, lower the cost, and widen the margin of profit on each job.

The new Champion "Red Devil" Rod represents the art in its most efficient stage of development. Any member of our regular sales force will be glad to arrange a demonstration in your plant, using any job you may be kind enough to select. Or write us, indicating your specific requirements.

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The **CHAMPION RIVET Co.**

WESTERN OFFICE

CLEVELAND, OHIO

EAST CHICAGO, IND.

Manufacturers of Champion Welding Rods, Victor Brand Boiler and Structural Rivets

James J. Mitchum, 802 North Dearborn Street, to manufacture sheet metal products.

Streek-O-Lite Corp., Indianapolis, has been organized by Charles L. Dillingham and J. C. Schaf, Jr., 4101 North Penn Avenue, to manufacture electrical and mechanical equipment.

Hayes Body Corp., Grand Rapids, Mich., has secured contract from Willys-Overland Co., Toledo, Ohio, for bodies for low-priced cars. Company also has orders for bodies from Reo Motor Car Co., Lansing, Mich., and Marmon Motor Car Co., Indianapolis, and plans increased production schedule.

Detroit Foundry Co., Inc., 1521 First National Bank Building, Detroit, has been organized by Ivan I. Meisner and associates, to manufacture iron, steel and other metal castings, and operate a machine works.

L. A. Young Spring & Wire Corp., 9200 Russell Street, Detroit, is increasing production schedule, reinstating about 150 employees.

Michigan Central Railroad Co., Terminal Building, Detroit, has resumed operations at locomotive shops at St. Thomas, Ont., following shutdown of several weeks, recalling about 200 men.

Russell Furnace Co., Albion, Mich., is planning one-story addition, 30 x 100 ft., for production of plow points and kindred specialties. Cost about \$25,000 with equipment.

Austin Machinery Corp., 2969 Lake Shore Drive, Muskegon, Mich., has been organized by W. E. Jeannot, 1691 Jefferson Street, and associates, to manufacture machinery and parts.

Pere Marquette Railway Co., Detroit, is increasing production schedule at Wyoming repair shops, Grand Rapids, Mich., recalling about 600 men on close to full-time basis.

Eurant Motors, Inc., Lansing, Mich., plant will be offered at public sale Oct. 6 by Central Trust Co., Lansing, receiver. No bids were tendered at sale held on Sept. 9. Plant consists of 47 acres, with 22 buildings totaling 918,298 sq. ft. floor space. It has reproduction appraisal value of \$2,244,260.

Hillman Transportation Co., First National Bank Building, Pittsburgh, plans erection of coal storage and distributing plant unit at Dravosburg on Monongahela River, including bins, unloading platform, etc.

Apollo Steel Co., Apollo, Pa., has increased production schedule, reinstating a large number of men.

◀ MIDDLE WEST ▶

City Council, Elgin, Ill., has authorized immediate call for bids for two electric-operated centrifugal pumping units, daily capacity 2,000,000 and 1,000,000 gal. respectively, for municipal waterworks.

Excelsior Stove & Mfg. Co., Quincy, Ill., has resumed operations following curtailment for several months, reinstating about 250 men.

Caterpillar Tractor Co., Peoria, Ill., is planning early discontinuance of branch plant at Minneapolis and will transfer that works to Peoria, where production will be concentrated.

American Cap & Set Screw Co., Market Street, Waukegan, Ill., has been organized by Frank W. Freise and Edgar W. Hoolman, Waukegan, to manufacture cap screws, set screws and kindred mechanical products.

Four-Wheel Drive Co., Clintonville, Wis., manufacturer of motor trucks, parts, etc., is converting branch service and repair works at Kitchener, Ont., for motor truck manufacture, to operate as branch Canadian works.

Milwaukee Road, 516 West Jackson Boulevard, Chicago, has work under way on one-story engine house and machine shop at Mitchell, S. D. Cost about \$25,000 with equipment.

Butler Brothers, Nashwauk, Minn., have resumed operations at local iron ore mining properties, following shutdown for several weeks, recalling about 300 men. Plant will operate on day and night basis for present.

Village Council, Mahtomedi, Minn., has authorized plans for a municipal electric light and power plant. Cost over \$45,000 with equipment. P. R. Banister, 69 Seventh Avenue, N. E., North St. Paul, Minn., is consulting engineer.

Superintendent, United States Indian Service, Rapid City Indian School, Rapid City, S. D., asks bids until Sept. 30 for one 75,000-gal. elevated steel tank on steel tower.

M. P. Heinze Machine Co., 341 West Superior Street, Chicago, has been organized by M. P. and George M. Heinze, capital \$50,000, to operate a general machine works, manufacture tools and machine parts.

Chicago, Burlington & Quincy Railroad Co., Chicago, has reopened car and locomotive repair shops at Havelock, Lincoln, Neb., following curtailment for several weeks, recalling about 400 men.

Minnesota Gas & Oil Co., Willmar, Minn., has plans for bulk oil storage and distributing plant, with pumping station. Cost over \$25,000 with tanks and equipment.

Construction Service, Veterans' Administration, Washington, asks bids until Oct. 11 for new boiler and stoker equipment for institution at Sheridan, Wyo.

Abbotsford, Wis., closes bids Sept. 30 for construction and equipment of municipal sewage system and disposal plant. Druar & Millowski, 904 Globe Building, St. Paul, Minn., are consulting engineers. Fred W. Moecker is village clerk.

Bass Brothers, 3161 North Thirty-first Street, Milwaukee, scrap dealers, have let contracts for two-story addition, 30 x 108 ft., part basement.

John T. La Forge Co., Webster City, Iowa, operating rendering plants at Webster City, Iowa Falls and Boone, Iowa, has plans for new soap manufacturing plant at first noted place. Cost over \$50,000 with machinery.

City Council, Des Moines, Iowa, has taken bids on general contract for removal and reconstruction of hangar unit at municipal airport to another location, unit to be 100 x 100 ft., with repair and reconditioning department. Amos B. Emery, 543 Fifth Street, is architect.

Allis-Chalmers Mfg. Co., Milwaukee, has purchased South American business of B. F. Avery & Sons, Louisville, Ky., including five branches in Argentina, Paraguay and Uruguay. These will be continued under management of Charles E. Houston, for 21 years general manager of Avery South American interests.

◀ SOUTH CENTRAL ▶

Bogalusa Paper Co., Inc., Bogalusa, La., is considering extensions and improvements, including additions to Nos. 1 and 2 paper machines, bleaching plant unit, new sulphate recovery system, new evaporators and pulp washers, pulp screens, lime burners, storage tanks, etc.; also for extensions in power plant, with installation of new turbo-generators, boilers and auxiliary equipment. Cost over \$100,000 with equipment. United Engineers & Constructors, 112 North Broad Street, Philadelphia, consulting engineer, is now making survey.

Louisville & Nashville Railroad Co., Louisville, is increasing production schedules at car repair and locomotive shops at Louisville and other points, reinstating about 500 men.

French Market Corp., New Orleans, care S. S. Stone, Jr., Masonic Building, architect, plans installation of conveying, unloading and other mechanical-handling equipment, ice and coal storage machinery in new one-story public market, 60 x 500 ft. Cost about \$250,000 with equipment.

Treasury Department, Washington, plans erection of additional field units at Barksdale Air Field, Shreveport, La., to cost \$270,000 with equipment.

R. A. Myers, 4622 West Broadway, Louisville, is at head of project to erect a hydro-electric generating plant on Cumberland River, near Monticello and Jamestown, Ky., for electric light and power service at these places and neighboring communities.

City Council, Anniston, Ala., is considering installation of municipal waterworks, with pumping machinery and other power equipment, pipe lines, etc. Cost over \$400,000. Frank C. Leyden is head of Council Committee in charge.

◀ PACIFIC COAST ▶

Southern California Gas Co., 1700 Santa Fe Avenue, Los Angeles, has let general contract to C. L. Peck, 354 South Spring Street, for one-story shop, 110 x 295 ft. Part of unit will be used for service and repair of company cars and motor trucks. Cost about \$75,000 with equipment.

Hammel Radiator Co., 715 South Figueroa Street, Los Angeles, manufacturer of gas-steam radiators, wall heaters, parts, etc., has acquired plant and business of Braasch Furnace Corp., Ltd., 1041 North Orange Drive, manufacturer of sectional furnace units, gas radiators and other heating equipment, and will operate as a subsidiary. Braasch plant at Hollywood will be remodeled and additional equipment installed. A. J. Braasch will continue in charge of production.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept.

27 for 150 forced-draft motor-driven blowers, 10 sets fan wheels, and 150 motor brushes and spare parts (Schedule 8721); until Oct. 4, one disk and spindle sander and one saw table, both motor driven (Schedule 8739), one utility type trailer (Schedule 8735), all for San Diego Navy Yard; until Sept. 27, electric storage batteries and separators (Schedule 8760), until Oct. 4, carbon and high-speed twist drills (Schedule 8736) for Mare Island Navy Yard.

City Purchasing Agent, Thomas Oughton, City Hall, Los Angeles, asks bids until Sept. 27 for one steam turbine electric generator unit, 81,250-kva. capacity (Specification 2827).

Ozard Water Filter Co., Los Angeles, care of E. P. Peers, 649 South Olive Street, has been organized by Howard L. and George H. Beazell, Santa Monica, Cal., to manufacture water filters and parts.

Board of City Commissioners, Phoenix, Ariz., Commissioner David P. Kimball, acting mayor, is considering erection of a municipal electric light and power plant for street railway and street lighting systems.

◀ CANADA ▶

Dodge Mfg. Co., Toronto, manufacturer of conveying and power transmission equipment, has purchased controlling interest in Canadian Mead-Morrison Co., Ltd., Welland, manufacturer of coal-handling machinery, coal bridges, dredges, hoisting equipment, etc., and will operate as a subsidiary. Welland works covers about 10 acres, with structural steel shop, machine shops, dry dock, foundry, pattern shop and other buildings. T. A. McAuley, president of purchasing company, has been elected president of acquired organization.

Canadian Vickers, Ltd., Montreal, is manufacturing Moore speed cranes, a product of Manitowoc Engineering Co., Manitowoc, Wis. Crane is convertible into a shovel, dragline or trencher.

Pacific Mills, Vancouver, B. C., manufacturer of paper products, are enlarging their plant to turn out solid fibre containers. Machinery costing about \$100,000 will be installed.

Piston Ring Co., Toledo, Ohio, has plans to establish a Canadian branch at Windsor, Ont.

International Printing Ink Corp., 75 Varick Street, New York, has leased space at Toronto for establishment of a plant. About \$150,000 will be expended for equipment.

Pacific Mills, Ltd., Standard Bank Building, Vancouver, B. C., will erect a two-story addition to cost \$27,000. Company is in market for machinery to manufacture solid fibre containers. W. G. Swan, Birks Building, is architect.

Shell Oil Co. of Canada, 21 Dundas Square, Toronto, has awarded a number of contracts for garage and machine shop to be built in connection with \$2,000,000 oil refinery at Montreal East. Equipment has not been purchased.

◀ FOREIGN ▶

Mitsui Mining Co., Tokyo, Japan, affiliated with Mitsui & Co., Ltd., 350 Fifth Avenue, New York, has concluded agreement with E. I. duPont de Nemours & Co., Wilmington, Del., for rights of Claude process for production of hydrogen in Japan, and plans erection of new works utilizing process at Miike, Kiushiu, where company operates extensive coal mines. Cost over \$1,500,000 with machinery. Engineering department of duPont company will furnish plans and technical assistance. Dr. Fusano Isobe is chief engineer for Mitsui company.

Ministry of Interior, Municipalities and Local Commissions Section, Cairo, Egypt, asks bids until Oct. 27 for four Diesel lubricating oil recovery plants of settling tank type (not centrifugal), electric-operated.

Spanish Firestone Tire & Rubber Co., Ltd. (Firestone Hispano), Madrid, Spain, recently organized as subsidiary of Firestone Tire & Rubber Co., Akron, Ohio, has selected property at Bilbao, Spain, for new plant. Cost over \$500,000 with machinery.

Tel Aviv Iron Works, Tel Aviv, Palestine (Arabia), plans expansion, including new division for production of nails and kindred wire goods.

British-Iberian Minerals, Ltd., 17 Mincing Lane, London, England, recently organized by E. W. and E. E. Barnett, W. R. Hoeking and associates, plans development of mining properties at Garrucha, Aguilas and Almeria, Spain, for production of mica, talc, sulphur and kindred materials. Mining equipment and mill machinery will be installed.

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Controlled Cooling for Heat-Treating Furnaces

(Concluded from 449)

The rate of heat extraction may be controlled by adjusting the blower speed or regulating a valve in the discharge side, to secure any rate of cooling desired.

For example, in annealing some alloy steels, it may be necessary to hold at temperature for a long time and cool at a very slow rate, particularly during the early part of the cycle, and it is necessary to avoid scaling or decarburization of the material during this long period at temperature. By providing the furnace with a suitable atmosphere which is neutral to the steel, and providing cooling means for the atmosphere, the temperature, atmosphere and cooling rates are subject to absolute control. In general it is not necessary to cool such materials to low temperatures, it usually being permissible to remove them from the furnace when a temperature of approximately 1000 deg. F. has been reached.

Removal at a higher temperature releases the furnace, thus increasing its output, and obviously this should be done at as high a temperature as practicable consistent with the desired results in the annealed material.

Such furnaces are well suited to annealing tubing and bar stock of carbon or alloy steel, silicon sheets and punchings for electrical machinery, auto body and similar sheets which require deoxidized finish, etc.

Furnaces with Portable Hoods

As an example of the third method, reference may be had to Fig. 5 which shows a portable hood type furnace with several bases, each base being provided with a motor-driven fan for circulating the atmosphere. The load is covered with a hood or retort made from heat-resisting alloy sheet, having an extending flange at the bottom and a vertical seal ring, which engages with a liquid seal channel around the outer edge of the base.

The fan is run continuously during both the heating and the cooling cycles, providing positive and rapid circulation of the atmosphere upward over the inner surface of the hood and downward through the load, thus effecting rapid heat transfer between the hood and the load and equalization of temperature distribution throughout the charge.

When temperature has been reached, the heating chamber is transferred to another loaded base, and the covered load, from which the furnace has been removed, is allowed to cool to the desired temperature, the fan being kept running, which produces a reverse effect, causing rapid heat transfer between the load and the walls of the hood, thus effecting rapid cooling.

The furnace shown in Fig. 5 is used for bright annealing fine copper wire on spools, illuminating gas being employed for the furnace atmosphere. It has been found that heating and cooling can be accomplished in about one-half the time required with similar furnaces not equipped with a fan, thus practically doubling the output of a furnace equipment by the use of the fan.

Such furnaces are well suited for bright annealing copper or other non-ferrous wire or coiled strip, also for steel wire in coils, either high or low-carbon, as the atmosphere protects the material from decarburization as well as from oxidation. Similar furnaces without the fan are used quite extensively for bright annealing high and low-carbon cold-rolled strip.

The use of these furnaces for bright annealing steel wire, for the intermediate as well as the final an-

neals, offers the possibility of eliminating the pickling operation, the wire being taken directly from the furnaces to the drawing machines for further reduction.

Present Trends

The types of furnaces described in this article indicate some of the present trends in furnace design. Modern tendencies in all branches of industry are toward the development of special machines to meet the specific requirements of a process. Heating processes are no exception, and there has been a demand for higher and higher refinement in the heat treatment of many lines of products. Furnaces may now be designed to meet these special requirements, as regards physical properties and surface condition of the materials, and provide complete control of the heat-treating processes.

Electric furnaces have therefore become highly developed heat-treating machines, designed and applied to carry out heating processes with exactness, permitting accurate control of temperature, atmosphere and cooling rates.

Some Major Metallurgical and Heat Treating Developments

By J. M. WATSON

Metallurgical Engineer,
Hupp Motor Car Corp.,
Detroit

DUE to the fact that production has been curtailed during the past year, more attention has been given to the details of metallurgy, and consumers have become much more critical of their material than in times when the steel industry was working near its peak. There has been a steady increase in the percentage of steel purchased on a grain-size specification, and the steel companies generally have increased the capacity of steel made under this specification. There are several reasons why this development has taken place, chief of which is the fact that it responds uniformly to normalizing and annealing operations and gives increased capacity in the machine shops and more uniform results in heat treating.

A second major development has been construction of various types of furnaces, especially for carburizing, in which the temperature for atmos-

phere inside the furnace is very carefully controlled. The advent of the butane type of furnace and controlled gaseous atmospheres have improved the case-hardening type of gears especially, giving very high tooth pressures and much more satisfactory gradations from the case into the core of the finished piece.

From an inspection standpoint the deep-etch test has been developed considerably, and is being used more and more as a standard inspection, especially on complicated forgings, as the grain flow can be readily seen and a study of the design more intelligently made.

Another development has been the increased use of alloy cast irons, which give more uniform hardnesses and closer grained iron, which result in more uniform machining and, in the case of automobile cylinder blocks, a longer wearing material.



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Government Costs Must Come Down

(Concluded from Page 451)

marchers and the amazing proposals at Washington to vote billions, whatever the consequences to the nation's credit. Yet the rate at which State and local expenditures have been mounting has never had front page attention, though for years it has been of front page importance. From \$7.3 billion in 1925 the cost of State and local government has now reached \$10.7 billion, an increase of 50 per cent in seven years. In the same period, on the face of things, Federal appropriations for the running of the Government have increased only fractionally (\$3.8 billion in 1925 and \$4.2 billion in 1931). But these figures take on a very different look in the light of the Federal deficits and short time borrowing that have come in fashion latterly. It is a fair estimate that new Government issues in the fiscal year ending next June will run between \$2,000,000,000 and \$3,000,000,000, while for the fiscal year ended June 30, 1932, the excess of Federal Government expenditures over receipts was well above \$2,000,000. No reader of THE IRON AGE need be told what these stupendous sums will mean for future budgets.

Federal Taxes 30 Per Cent of All

In a later article something will be said of the causes of the present extravagant outlay of States and municipalities; but first we shall set

down the figures for Federal expenditure and over against them those for State and local expenditure. These and the annexed "pie" charts will show how the load is distributed.

For the fiscal year ending June 30, 1933, the operating expenditures of the Federal Government are estimated by the U. S. Budget Bureau at \$3,943,000,000. For the same year local government costs are estimated at \$8,300,000,000 and those of State governments at \$2,400,000,000—making the total of the triple pack \$14,643,000,000. Roughly, as the shaded and white sectors of our circle show, Federal taxation is 30 per cent and State and local taxation 70 per cent of the total.

War Taxpayer Enlisted for Life

Breaking down the Federal budget for the present fiscal year, we see the American taxpayer enlisted in a war many times longer than that in which the bonus army served. For most of the four million men drafted for the A.E.F. the war was a matter of a year and a half and the fighting time was limited to six months. But the payer of Federal taxes has a pack on his back that not only will be there as long as he lives but, if the bonus army has its way even promises to be a bigger pack with every passing year. Glaringly, in the accompanying chart and the statement of percentage

items in the Federal budget, World War and other military costs stand out as the consumer of 72 cents out of every dollar levied for Federal taxes.

[Later articles will deal with causes that have made high cost of government the paramount issue before the American people—causes which in the seven years from 1925 to 1932 have swelled all Government expenditure from 11.1 billions a year to 14.6 billions a year, or an average annual increase of \$500,000,000. Also it will appear how the rapid increase in public spending has affected business and the well being of every citizen, taxpayer or non-taxpayer, aggravating the depression and delaying recovery.]

The story will be told of steps already taken and measures proposed for the reduction of tax burdens, and an account will be given of the campaign now under way all over the country to secure speedy action by Congress and by State and local authorities to cut down public expenditure. This movement has in it larger promise than any of the forces now at work for the rebuilding of business.]

Coke Stacker Mounted on Locomotive Crane

A MILD winter and limited storage space presented one of the large by-product coke companies with the problem of what to do with the accumulating coke. Various handling schemes were considered.

The scheme adopted, and one which is performing to the satisfaction of the coke company, is that depicted in the accompanying illustration. Both cranes are of the locomotive track type, and have been serving the company for many years. It was simply necessary to provide and mount a receiving hopper, feeder and storage conveyor on the one machine, as shown.

No changes were required in the crane, with the exception of the removal of some diagonal bracing and the reinforcing of chords on the boom. The steel tower sets over the crane house and is bolted to it.

The receiving hopper holds 10 tons. A 24 in. wide belt feeder carries the coke from hopper to the storage conveyor, which is 87 ft. long by 24 in. wide, and employs anti-friction idlers. A 5-hp. electric motor operates both conveyors.

The storage conveying unit, engineered and furnished by Link-Belt

Co., Philadelphia, has a contract handling capacity of 30 tons of coke per

hour. Twice this quantity was handled in the initial test.



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